FD-20A

SERVICE MANUAL

US Model
Canadian Model
E Model

watchman

SPECIFICATIONS

TV standard	American TV standard
Channel coverage	VHF channel 2–13 UHF channels 14–83
Antenna	VHF/UHF telescopic antenna
Picture tube	5-cm (2-inch) picture measured diagonally
Speaker	Approx. 3 cm (1.2 inches) dia.
Input	Video input jack (minijack) 1 V (p-p), 75 ohms unbalanced, sync negative
Output	Earphone/headphone jack (minijack) load impedance 8–300 ohms
Battery life	See page 5.
Power requirements	6 V dc: Batteries four size AA alkaline batteries (IEC designation LR6) BP-23 rechargeable battery pack (optional) DC IN 6 V jack accepts: AC-129WA ac power adaptor (supplied with the Canadian model, optional for US model) for use on 120 V ac, 60 Hz AC-4A ac power adaptor (supplied with E model) for use on 110, 120, 220 or 240 V ac, 50/60 Hz DCC-127A car battery cord (optional) for use on 12 V car battery Battery case (optional) EBP-6 for use on four size C alkaline batteries (IEC designation LR14)
Dimensions	Approx. 83.8 x 167.9 x 39.7 mm (w/h/d) (3.3 x 6.6 x 1.6 inches) including projecting parts and controls
Weight	Approx. 510 g (1 lb 2 oz) including batteries

FLAT BLACK AND WHITE TV

SONY®

B&W

MICROFILM

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SAFETY-RELATED COMPONENT WARNING !!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY. CIRCUIT ADJUSTMENTS THAT ARE CRITICAL TO SAFE OPERATION ARE IDENTIFIED IN THIS MANUAL. FOLLOW THESE PROCEDURES WHENEVER CRITICAL COMPONENTS ARE REPLACED OR IMPROPER OPERATION IS SUSPECTED.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFIÉS PAR UNE TRAME ET UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the interboard wiring to ensure that no wires are "pinched" or contact high-wattage resistors.
3. Check that all control knobs, shields, covers, ground straps, and mounting hardware have been replaced. Be absolutely certain that you have replaced all the insulators.
4. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.
5. Look for parts which, though functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.
6. Check the line cord for cracks and abrasion. Recommend the replacement of any such line cord to the customer.
7. Check the condition of the monopole antenna (if any).
   Make sure the end is not broken off, and has the plastic cap on it. Point out the danger of impalement on a broken antenna to the customer, and recommend the antenna's replacement.
8. Check the B+ and HV to see they are at the values specified. Make sure your instruments are accurate; be suspicious of your HV meter if sets always have low HV.
9. Check the antenna terminals, metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 0.5 mA (500 microampers). Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 0.75 V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 2 V AC range are suitable. (See Fig. A)

HOW TO FIND A GOOD EARTH GROUND

A cold-water pipe is guaranteed earth ground; the cover-plate retaining screw on most AC outlet boxes is also at earth ground. If the retaining screw is to be used as your earth-ground, verify that it is at ground by measuring the resistance between it and a cold-water pipe with an ohmmeter. The reading should be zero ohms. If a cold-water pipe is not accessible, connect a 60–100 watts trouble light (not a neon lamp) between the hot side of the receptacle and the retaining screw. Try both slots, if necessary, to locate the hot side of the line, the lamp should light at normal brilliance if the screw is at ground potential. (See Fig. B)

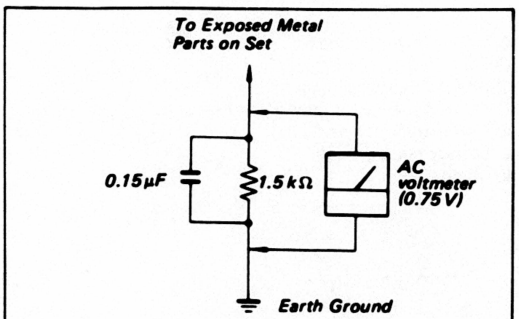


Fig. A. Using an AC voltmeter to check AC leakage.

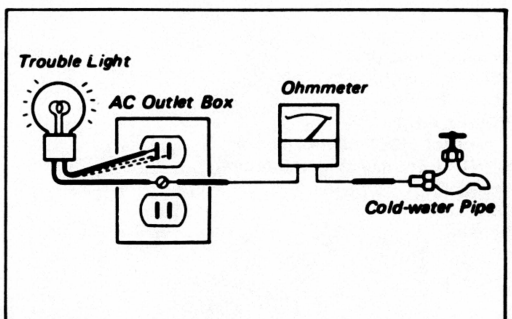
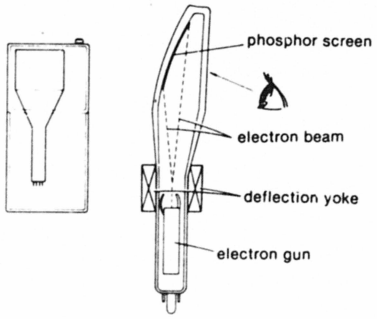


Fig. B. Checking for earth ground.

SECTION 1
GENERAL

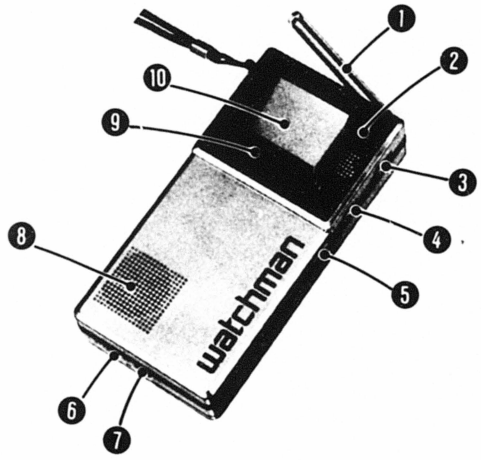
1-1. FEATURES

The FD-20A is a handy 2-inch flat TV which employs Sony's newly-developed monochrome FD (flat display) tube.

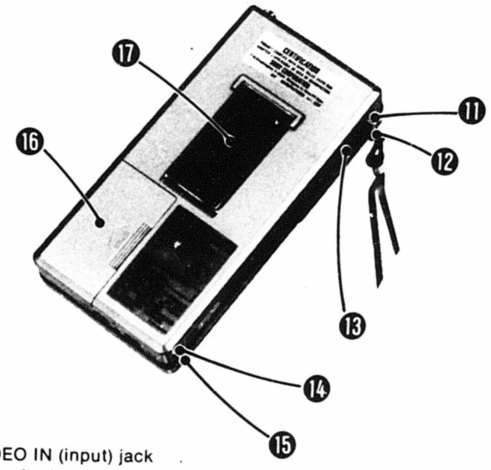


- The recessed phosphor screen provides clear viewing even in a bright place.
- A VIDEO IN jack for monitoring the picture being recorded with the video camera.
- Built-in stand for tabletop viewing.
- Five different power sources: batteries, house current, rechargeable battery, battery case and 12 V car battery.

1-2. PARTS IDENTIFICATION



❶ Telescopic antenna
❷ Volume indicator
❸ VOLUME control
❹ TUNING control
❺ POWER switch
❻ V (vertical) HOLD control (bottom)
❼ CONTR (contrast) control (bottom)
❽ Speaker
❾ Dial scale
❿ Screen



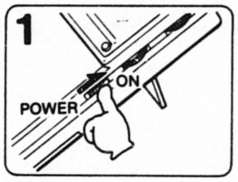
⓫ VIDEO IN (input) jack
⓬ Loop for hand strap
⓭ BAND SELECT switch
⓮ DC IN 6 V (external power input) jack
⓯ EAR (earphone) jack
⓰ Battery compartment
⓱ Stand

1-3. BATTERY INSTALLATION

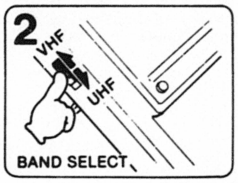
Battery life
Watching TV at a normal sound level and normal temperatures, you can expect approx. 3 hours with Eveready No. E91 alkaline batteries.
- When using the set in a very cold place, or when the volume is set to maximum during continuous operation, the battery life may be shortened.
- The life of batteries of other manufacturers or of other type batteries may be different.
- For maximum performance we recommend the use of alkaline batteries.

When the batteries become weak, the picture will become small. However, you can still see the picture for a while. When the picture becomes suddenly dim, replace all the batteries with new ones.

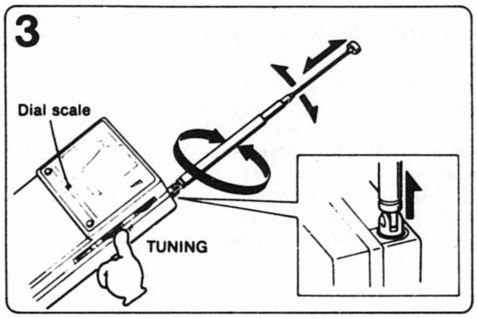
For other power sources, see page 6.



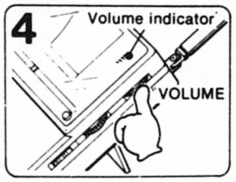
Set the POWER switch to ON.



Select the VHF (for channels 2 through 13) or UHF (for channels 14 through 83) with the BAND SELECT switch.



Turn the TUNING knob to tune in the desired channel, as marked on the dial scale.
Pull out the telescopic antenna fully and adjust its length, direction and angle for the best reception.



Adjust the VOLUME control.
Turn upwards for more volume.

After using
Set the POWER switch to OFF, and position the antenna perpendicularly to the set, then push it back into the set.

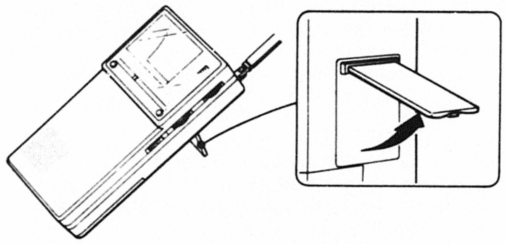
Note
Make sure that nothing is connected to the VIDEO IN jack. Otherwise no picture can be seen.

HOW TO USE THE EARPHONE
The use of an earphone is recommended in noisy places or outdoors. Connect the Sony MDR-E152 or ME-20B earphone (optional) to the EAR jack.
You can connect stereo headphones with a stereo miniplug or the SS-WM20 speaker system (optional) to the EAR jack, too. The sound you will hear is monaural.

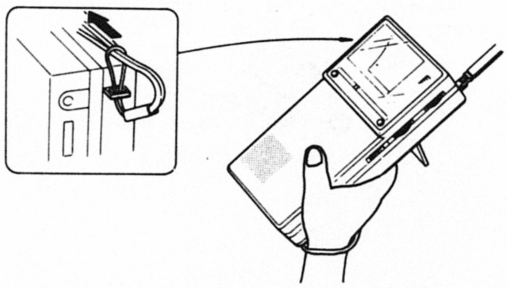
Caution: Avoid operating your set at so loud a volume that extended listening might affect your hearing.

1-4. WAYS OF TV WATCHING

WAYS OF TV WATCHING
Using the stand



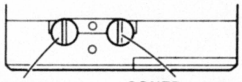
Using the hand strap



Note
Do not watch the TV with the TV set standing on end, as the set is very unstable in this position. Be sure to use the stand.

PICTURE ADJUSTMENT

If necessary, adjust the controls at the bottom with your finger tip.



V HOLD (vertical hold)control
If the picture moves up or down, or rolls, adjust the V HOLD control so that the picture is stable on every channels.

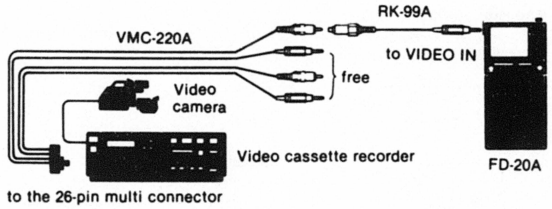
CONTR (contrast) control
The picture contrast becomes stronger by turning the control clockwise, and is reduced by turning it counterclockwise.

1-5. USING THE FD-20A WITH A VCR

You can monitor the picture being recorded with the video camera or playback picture of the video cassette recorder.

Connection of the TV and a video cassette recorder having 26-pin multi connector

Connect the RK-99A connecting cord (optional) to the VIDEO IN jack of the TV set. Using the VMC-220A video monitor cable (optional), connect the RK-99A and the multi connector of the video cassette recorder.



- If a plug is connected to the VIDEO IN jack, the signal from the TV set is automatically disconnected.
- The sound cannot be monitored.
- Contrast adjustment can be made without affecting the recording.

1-6. OTHER POWER SOURCES

HOUSE CURRENT (120 V ac)

Connect the DC IN 6 V jack of the TV set and the optional Sony AC-129WA ac power adaptor and connect the ac power adaptor to a wall outlet.

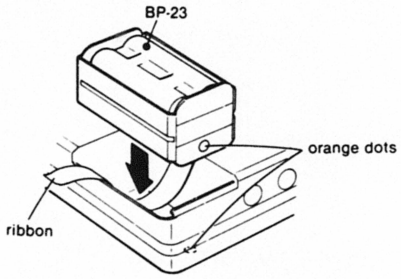
BATTERY CASE

Insert four size C alkaline batteries (IEC designation LR14) into the Sony EBP-6 battery case (optional) and connect the EBP-6 to the DC IN 6 V jack.
Using Eveready No. E93 alkaline batteries, you can expect approximately 10 hours of watching TV at a normal sound level.

Caution: When using the battery case, be sure to remove the rechargeable battery pack. If you leave the battery pack in the TV set, the batteries in the battery case will be drained when the POWER switch of the TV set is set at OFF.

RECHARGEABLE BATTERY PACK

Install the Sony BP-23 rechargeable battery pack (optional) into the battery compartment instead of the battery holder as illustrated.



To charge the battery pack, connect the TV set to a wall outlet using the AC-129WA ac power adaptor (optional). Charging time is about 9 hours. Approx. 1.5 hours of continuous operation is possible.

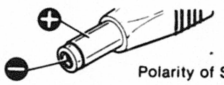
- Be sure to set the POWER switch to OFF while charging. When the POWER switch is in the ON position, the battery pack cannot be charged.
- When charging is completed, be sure to disconnect the AC-129WA from the wall outlet and the TV set.

CAR BATTERY

For use on 12 V car battery, connect the Sony DCC-127A car battery cord (optional) to the DC IN 6 V jack.

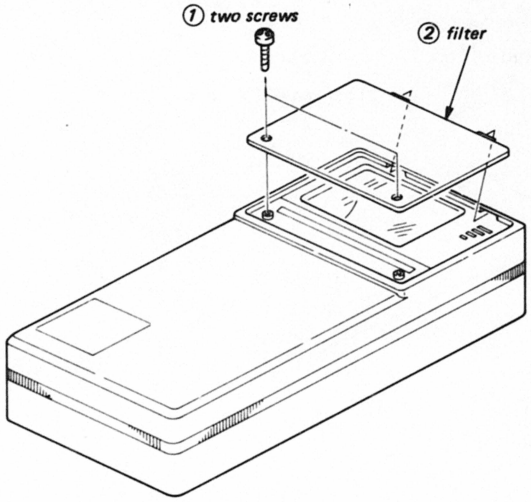
- Before connecting, be sure to set the output voltage of the car battery cord to 6 V.
- The DCC-127A is designed for use with a 12 V negative ground system.

Note: Use only an ac power adaptor or car battery cord manufactured by Sony. Polarity of the plug of other manufacturers may be different.

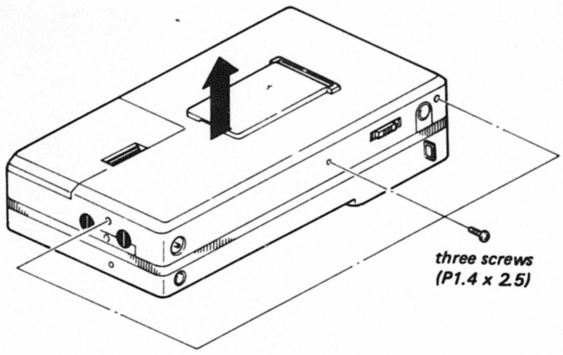


SECTION 2
DISASSEMBLY

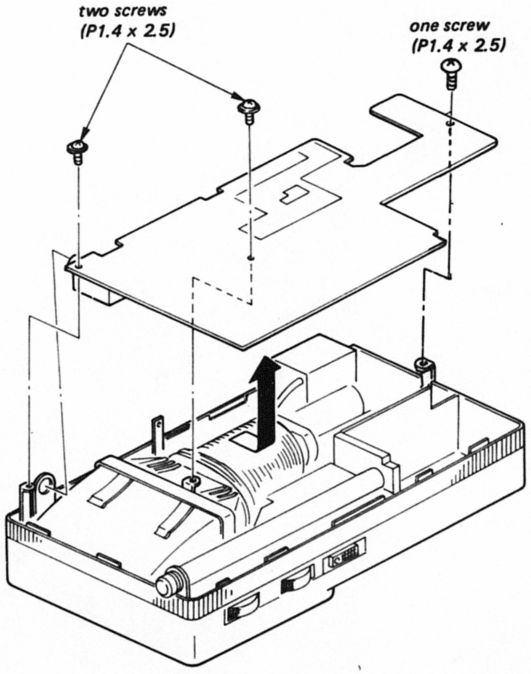
2-1. TOP ORNAMENTAL PLATE REMOVAL



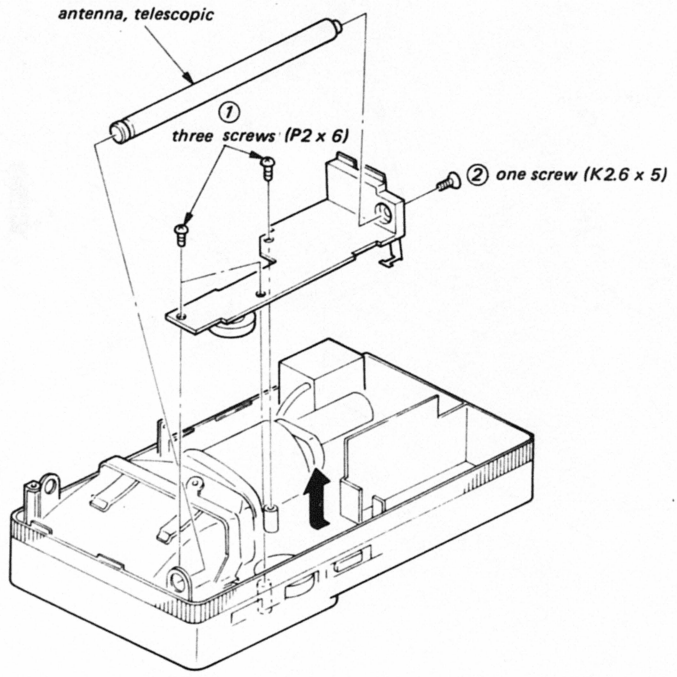
2-2. BACK COVER REMOVAL



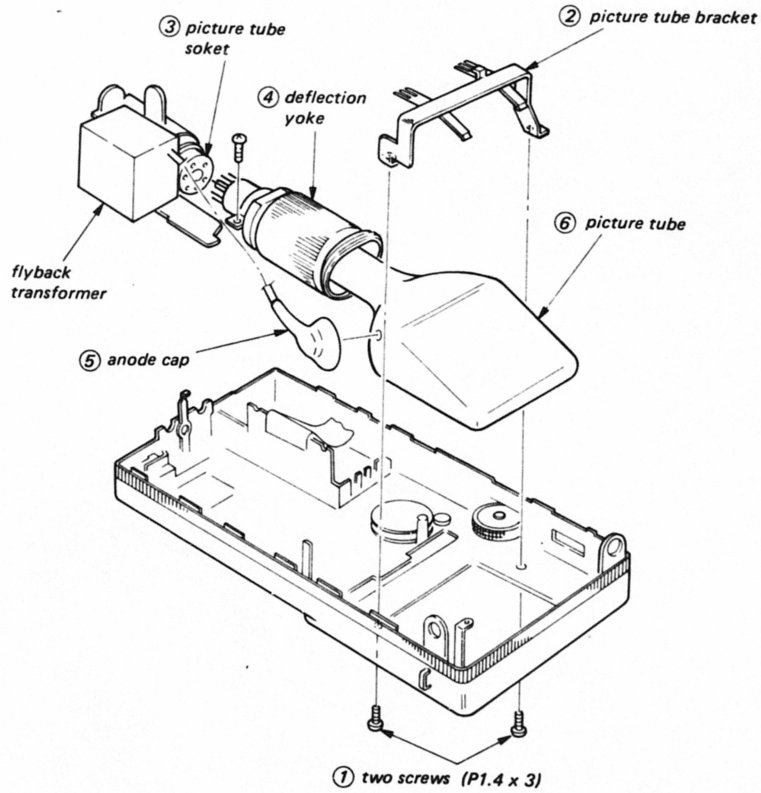
2-3. A BOARD REMOVAL



2-4. K BOARD REMOVAL



2-5. PICTURE TUBE REMOVAL

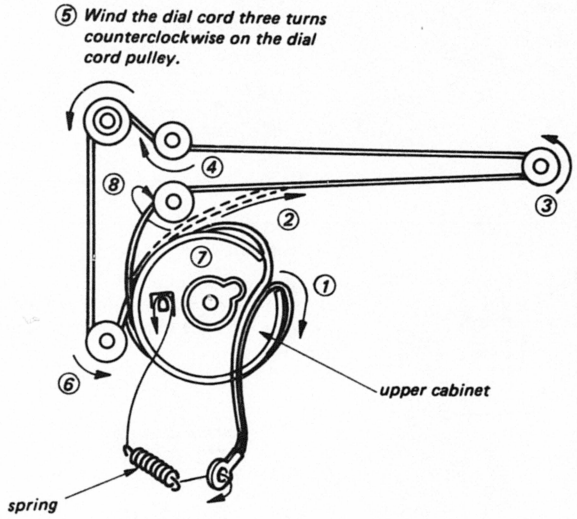


2-6. HOW TO STRING THE DIAL CORD

1) Hook one end of the spring onto the end of the dial cord.

2) Hook the other end of the spring onto the upper cabinet, attaching the end of the spring outward.

3) String the dial cord in numerical order.



SECTION 3
SAFETY RELATED ADJUSTMENTS

1. NOTE

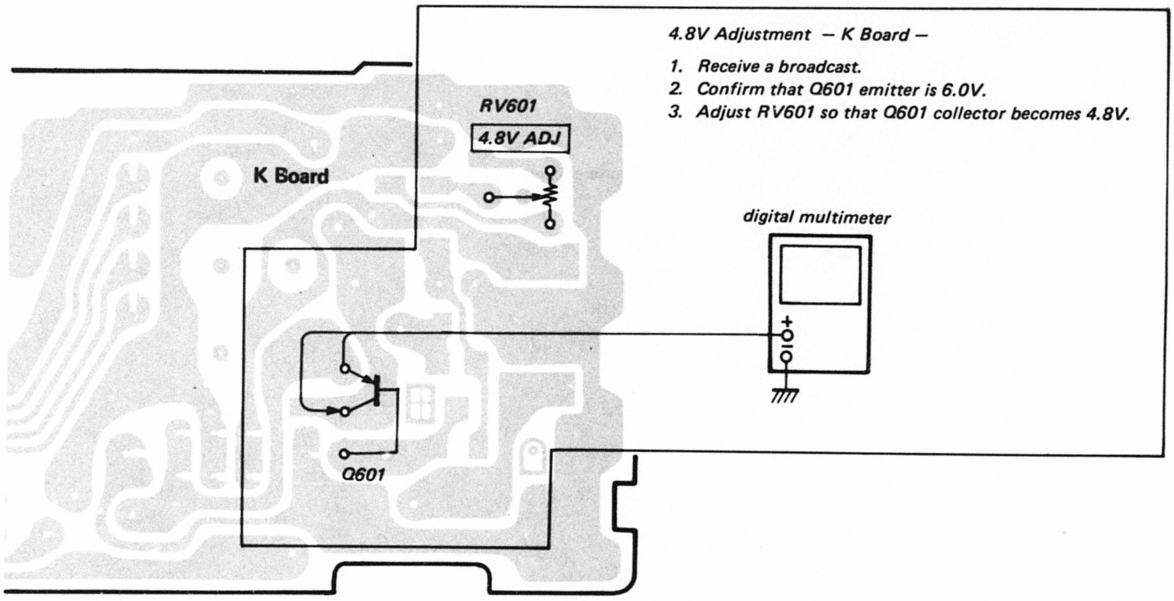
(1) TEST EQUIPMENT REQUIRED
1. Osilloscope
2. Digital voltmeter
3. Color bar/pattern generator
4. Regulated power supply

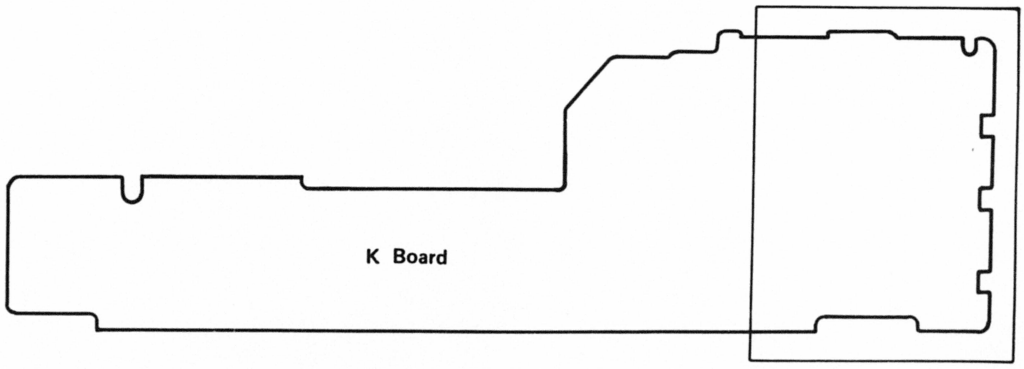
(2) INPUT SIGNAL
a cross-hatch, a color-bar or an off-air signal

(3) These adjustment should be performed with 6 V dc unless otherwise noted.

(4) ADJUSTMENT

Adjustment	Circuit Board	Page
Channel Display Circuit SIF VHF LOW END U END V-H END V-H START H HOLD H AMP V LINEARITY V SIZE	A	12, 13
BRT	A, D	13, 14
FOCUS	D	14
4.8V	K	11





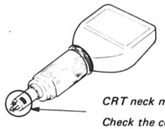
Channel Display Circuit Adjustment — A Board —

1. Set the band switch to VHF.
2. Receive VHF low channel (2 – 6) broadcast.
3. Match the needle to the cursor scale of the received channel.
4. Set the band switch to UHF.
5. Choose a receivable broadcast station from among UHF channels 60 – 83, and adjust RV152 for optimum reception when the needle is matched to the cursor scale with the tuning control.
6. Receive a broadcast from among channels 30 – 70, and confirm that the difference between the cursor scale and needle is within ±3 channels.
7. Set the band switch to VHF.
8. Choose a receivable broadcast station from among VHF channels 7 – 9, and adjust RV155 for optimum reception when the needle is matched to the cursor scale with the tuning control.
9. Choose a receivable broadcast station from among VHF channels 10 – 13, and adjust RV153 for optimum reception when the needle is matched to the cursor scale with the tuning control.
10. Confirm that there is no difference between the cursor scale and the needle for all channels received.

BRT Adjustment — A Board · D Board —

1. Solder bridge the pattern according to the color of the marking on the CRT neck.
   (Do not bridge more than 2 locations.)

marking color	A Board	D Board
red	R	R
green, or no marking	R	B
blue	B	B

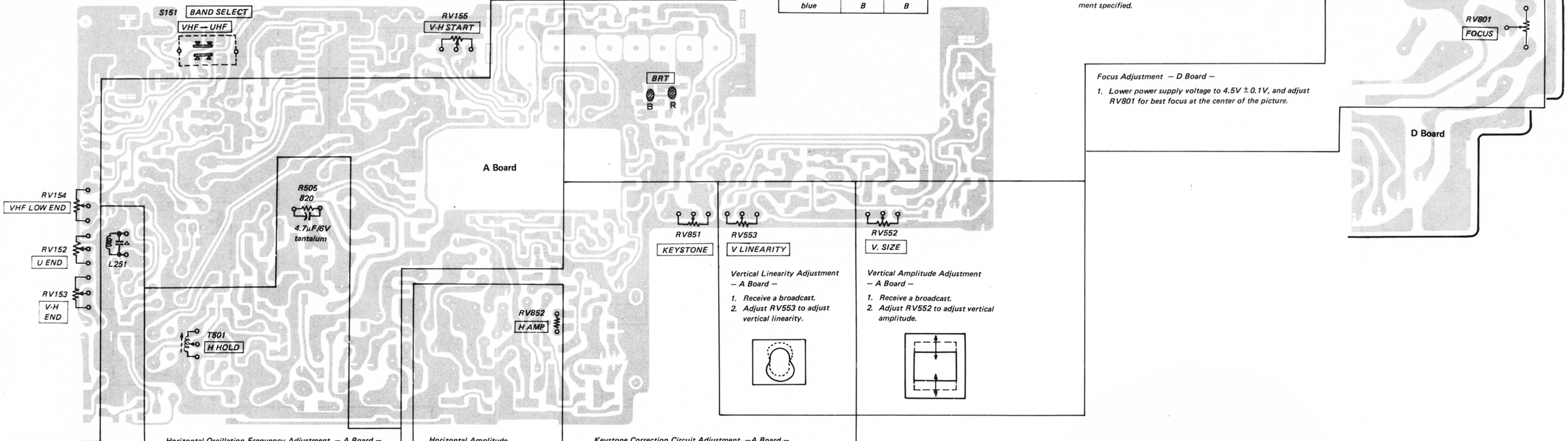


CRT neck marking position

Check the color of the marking here (red, green, blue and no marking) and perform the adjustment specified.

Focus Adjustment — D Board —

1. Lower power supply voltage to 4.5V ±0.1V, and adjust RV801 for best focus at the center of the picture.

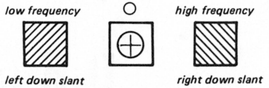


SIF Adjustment — A Board —

1. Adjust L251 for maximum volume and clear sound.

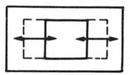
Horizontal Oscillation Frequency Adjustment — A Board —

1. Receive a broadcast.
2. Connet a 4.7μF/6V tantalum capacitor in series with R505.
3. Adjust the core of H HOLD adjustment coil (T501) so that the picture is as shown.



Horizontal Amplitude Adjustment — A Board —

1. Receive a broadcast.
2. Adjust RV852 to adjust horizontal amplitude.



Vertical Linearity Adjustment — A Board —

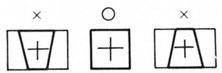
1. Receive a broadcast.
2. Adjust RV553 to adjust vertical linearity.

Vertical Amplitude Adjustment — A Board —

1. Receive a broadcast.
2. Adjust RV552 to adjust vertical amplitude.

Keystone Correction Circuit Adjustment — A Board —

1. Receive a broadcast.
2. Correct keystone distortion by adjusting keystone adjustment control (RV851) and horizontal amplitude adjustment control (RV852).



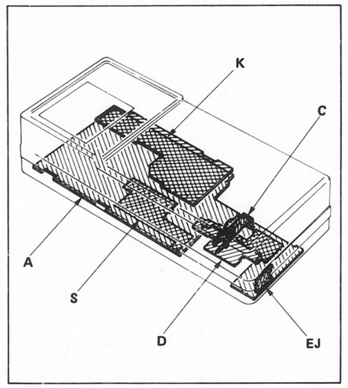
SEE ADDITIONAL INFORMATION

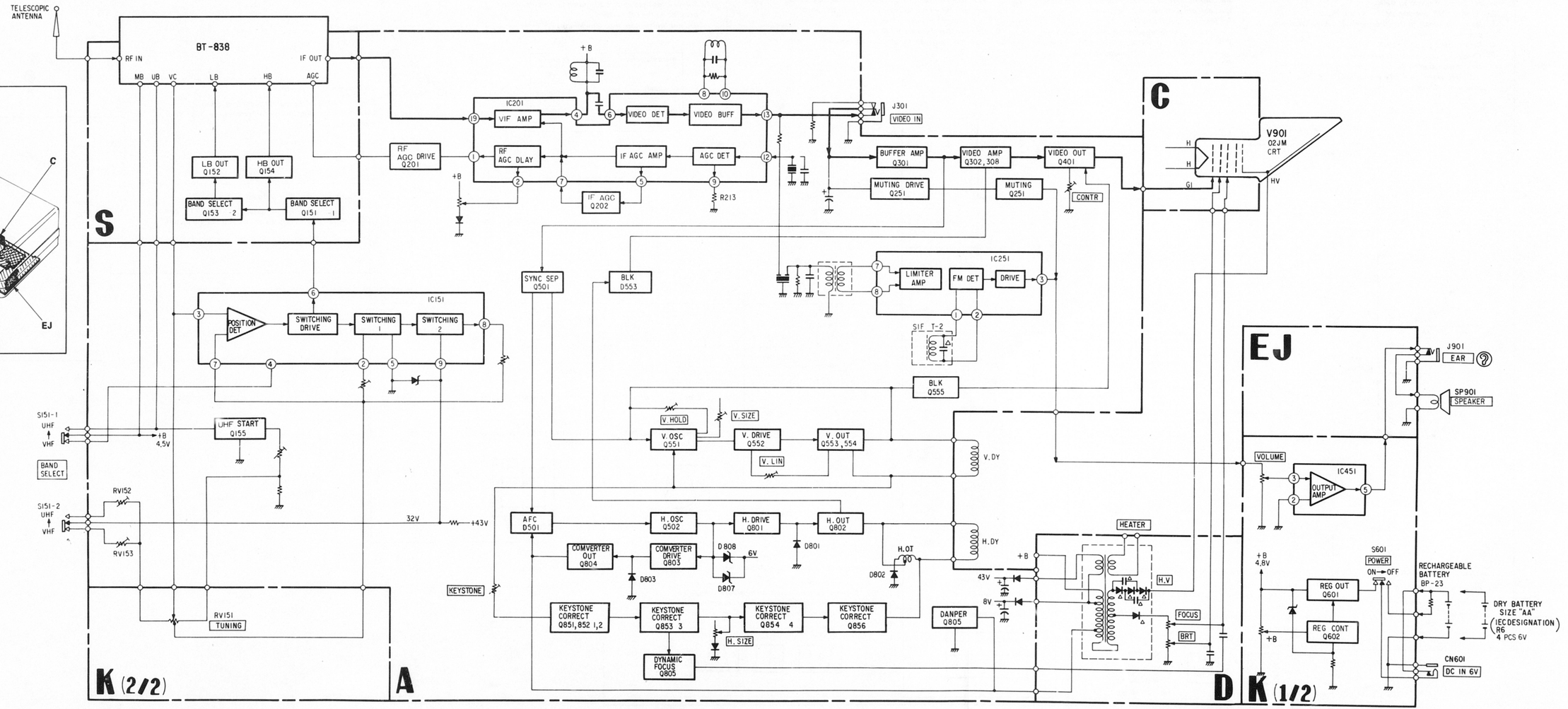
SEE ADDITIONAL INFORMATION

SEE ADDITIONAL INFORMATION

4-1. BLOCK DIAGRAMS

CIRCUIT BOARDS LOCATION

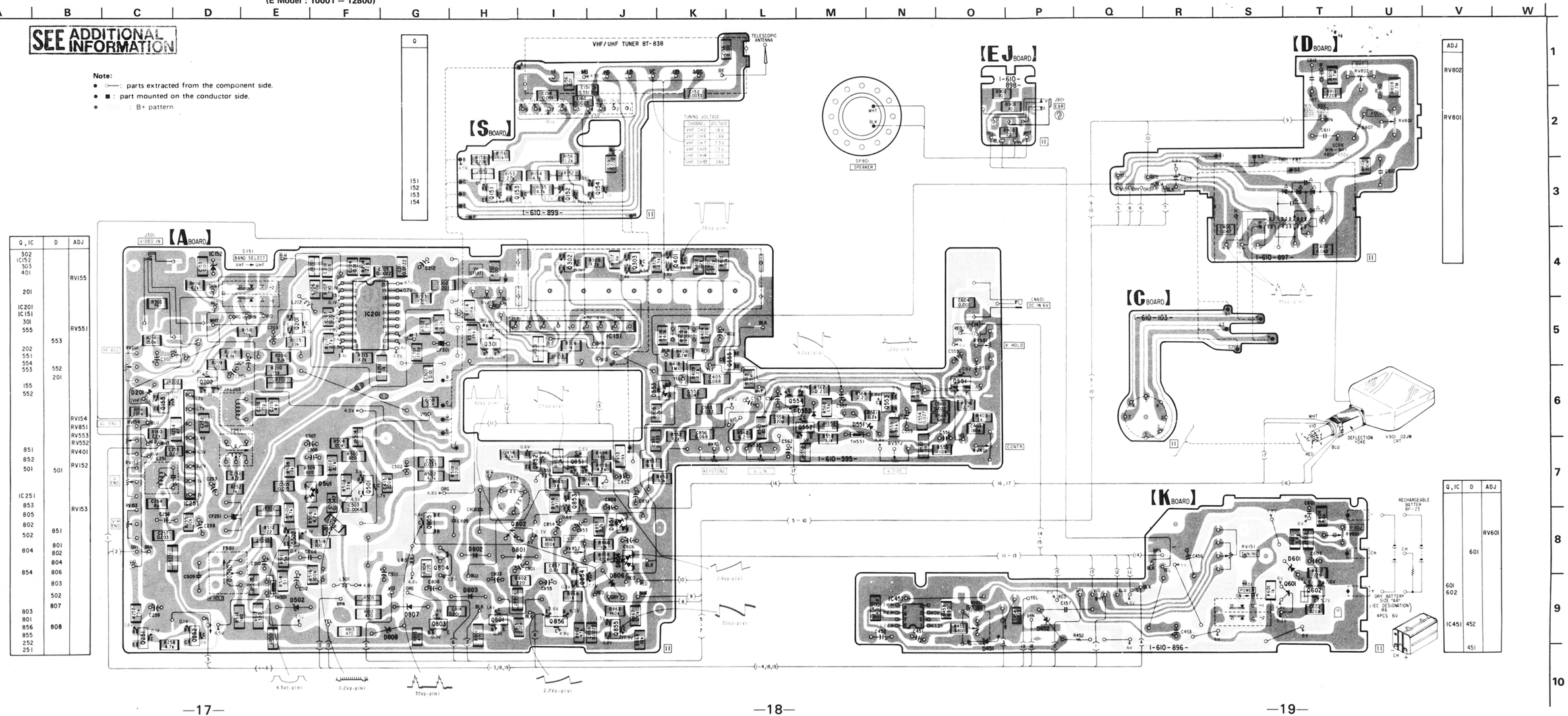




Serial No. (US Model : 40001 — 44000, 55001 — 57000)
(Canadian Model : 44001 — 45000)
(E Model : 10001 — 12800)

SEE ADDITIONAL INFORMATION

Note:
- ○—: parts extracted from the component side.
- ■ : part mounted on the conductor side.
- : B+ pattern



Q, IC	D	ADJ
302		
IC152		
303		
401		RV155
201		
IC201		
IC151		
301		RV551
555	553	
202		
551		
554		
553	552	
	201	
155		
552		
		RV154
		RV851
		RV553
		RV552
851		RV401
852		
501	501	RV152
IC251		
853		RV153
805		
802		
502	851	
804	801	
	802	
	804	
854	806	
	803	
	502	
	807	
803		
801		
856	808	
855		
252		
251		

Q, IC	D	ADJ
		RV602
		RV801

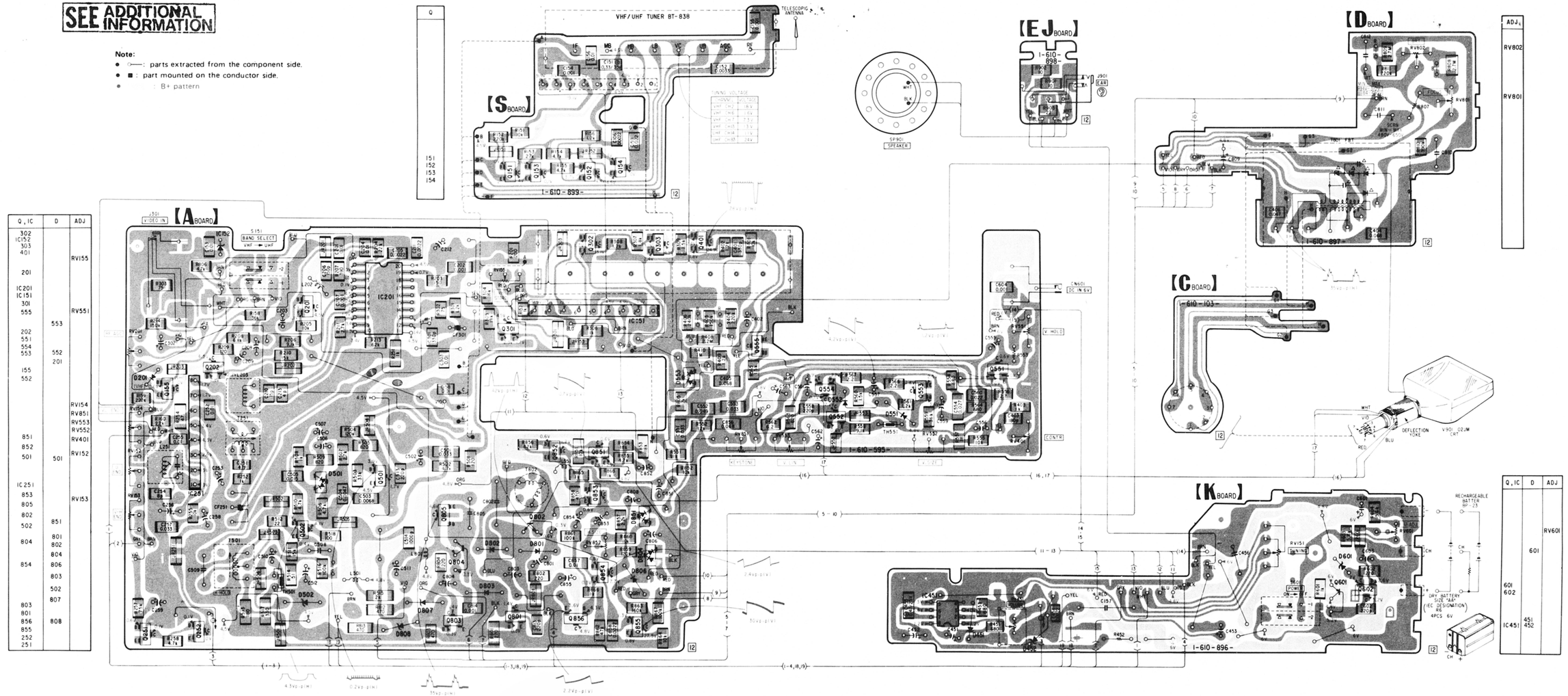
Q, IC	D	ADJ
		RV601
	601	
601		
602		
IC451	452	
	451	

Q
151
152
153
154

Serial No. (US, Canadian Model : 45001 – 55000, 57001 and later)
(E Model : 12801 and later)

SEE ADDITIONAL INFORMATION

Note:
- ○—: parts extracted from the component side.
- ■ : part mounted on the conductor side.
- : B+ pattern



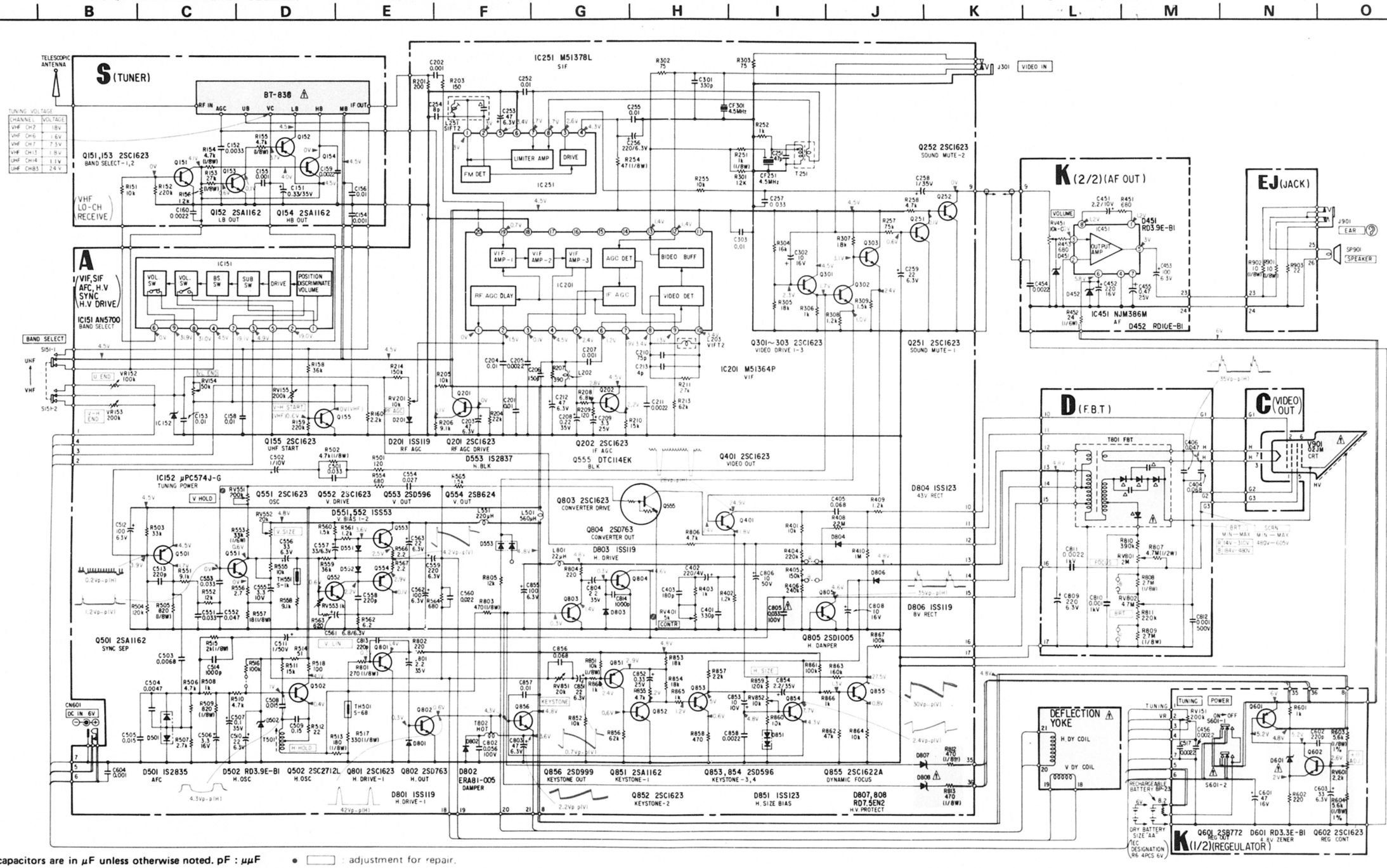
Q, IC	D	ADJ
302		
IC152		
303		
401		RV155
201		
IC201		
IC151		
301		RV551
555	553	
202		
551		
554	552	
553	201	
155		
552		
		RV154
		RV851
		RV553
		RV552
851		RV401
852		
501	501	RV152
IC251		
853		RV153
805		
802		
502	851	
	801	
804	802	
	804	
854	806	
	803	
	502	
	807	
803		
801		
856	808	
855		
252		
251		

Q
151
152
153
154

ADJ
RV802
RV801

Q, IC	D	ADJ
		RV601
	601	
601		
602		
IC451	451	
	452	

SEE ADDITIONAL INFORMATION



Note:

- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in ohms, 1/10 W unless otherwise noted. kΩ : 1000 Ω, MΩ : 1000 kΩ
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- △ : internal component.
- ▭ : panel designation.
- ▭ : adjustment for repair.
- ——: B+ bus.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken with a 10MΩ digital multimeter.
- Voltage variations may be noted due to normal production tolerances.
- Readings are taken with a color-bar signal input.

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

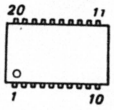
SEE ADDITIONAL INFORMATION

4-3. SEMICONDUCTORS

AN5700

M51378L

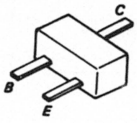
M51364P



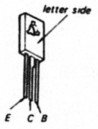
NJM386M

μPC574J-G

2SA812
2SA1162
2SA1179
2SA1179M6
2SB624
2SC1622A
2SC1623
2SC1623-L
2SC2712
2SC2712-L
2SC2812
2SD596
DTC114EK

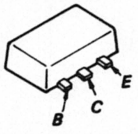


2SB772



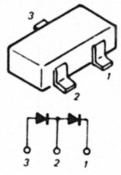
2SD763

2SD999
2SD1005

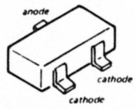


1SS119
1SS148

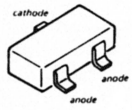
MA153TX
1SS123



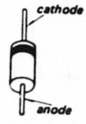
MA151WATW
1S2835



1S2837
MA151WKTX



1SS53
1SS133
RD10E-B1
RD3.3E-B1
RD3.9E-B1



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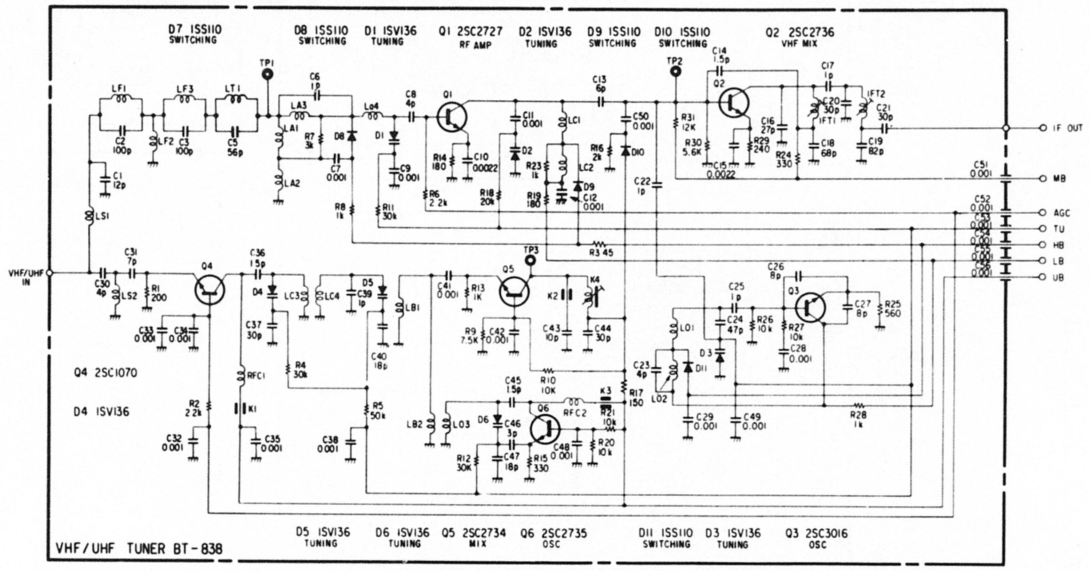
SEE ADDITIONAL INFORMATION

4-4. TUNER SCHEMATIC DIAGRAM

– UHF/VHF TUNER –

- **BT-838**



SECTION 5
CIRCUIT DESCRIPTION

5-1. Tuner Circuit

The tuner is a VHF, UHF 1 pack ET BT-838, developed for use in FD-20A.
The tuning system selects VHF or UHF with a band select switch and changes VC voltage with a tuning VR.
Formerly, VHF band high-low switching was required, but the tuning band circuit (IC151) has made this unnecessary.
Also, continuous channel selection is possible.

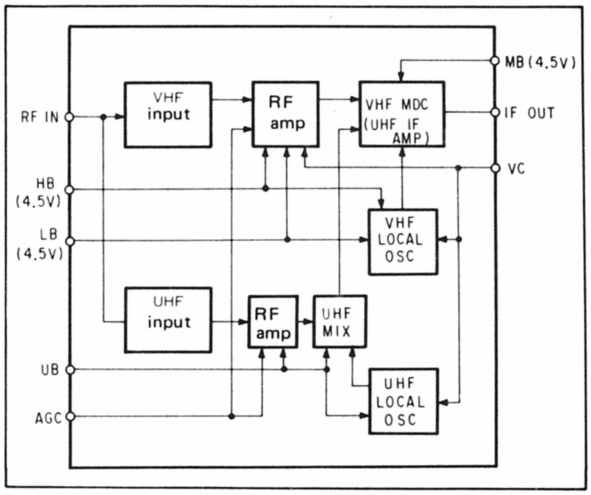


Fig. 1-1 BT-838 Block Diagram

Pin Functions

RF IN: RF input pin, input impedance 75Ω
IF OUT: IF frequency output (impedance 75Ω)
Output stage is composed of multiple tuning circuits, and has band response of about 8dB P/S ratio.
MB: Voltage always applied during VHF MIX stage power supply operation.
VC: Tuning control pin
HB: Power supply pin during VHF High channel
LB: Power supply pin during VHF Low channel
UB: Power supply pin during UHF channel reception
AGC: RF AGC voltage input pin (forward AGC)

5-2. Channel Selection Circuit

This circuit performs power supply to the tuner, setting of tuning voltage, and VHF low-high channel and UHF channel switching.

5-2-1. Tuning Band (VHF Low, High, UHF) Switching Operation

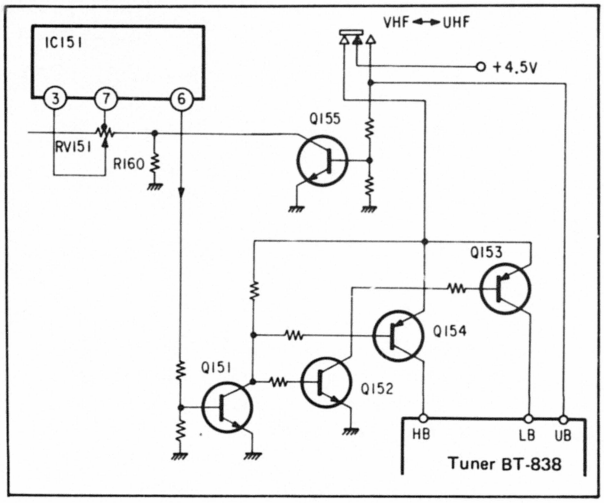


Fig. 2-1

Tuning band switching utilizes IC151 pin ⑥ output voltage.
Fixed voltage set by channel selection control tap is supplied to IC151 pin ⑦, and tuning voltage from channel selection control is supplied to pin ③.
Pin ⑦ and pin ③ are connected respectively to the comparator inside IC151, comparison is performed, and the high or low level of output pin ⑥ is set.

(1) VHF Low Channel
IC151 pin ⑥ output goes low, and Q151 goes off.
Therefore Q152 goes on and tunrs on Q153, so voltage is applied to tuner LB pin.

(2) VHF High Channel
IC151 pin ⑥ output goes high and Q151 goes on.
Therefore Q154 goes on and voltage is applied to tuner HB pin.

(3) UHF Channel
By switching the band select switch to UHF, +B voltage is applied to UB pin.

5-2-2. Tuning Voltage Setting

Because VHF channel is divided into V-Lov channel and V-High channel, tuning voltage is also applied differently.
This is done by having a fixed voltage output tap on channel selection VR RV151, and low channel and high channel are used differently before and after it. The tap position is set at 60% on the high channel side and 40% on the low channel side. Tuning voltage (VC) will be explained under the section on each tuning band.

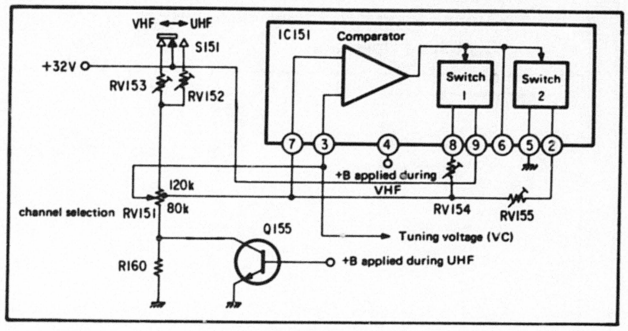


Fig. 2-2

(1) VHF Low Channel

When S151 is on the VHF side, and RV151 variable amount drops below the tap, IC151 comparator detects this and turns on Switch-1. (Switch-2 is off at this time.)

Therefore +32V is divided as shown in the figure and becomes tuning voltage (VC).

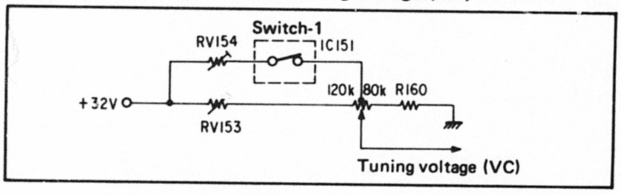


Fig. 2-3

(2) VHF High Channel

When S151 is on the VHF side and RV151 variable amount is above the tap, IC151 comparator detects this and turns on Switch-2. (Switch-1 is off at this time.)

Therefore +32V is divided as shown in the figure and becomes tuning voltage (VC).

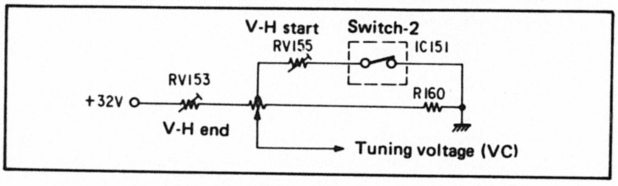


Fig. 2-4

(3) UHF Channel

When S151 is on the UHF side, +32V is divided at RV152, RV151. At this time the variable voltage obtained from RV151 is tuning voltage (VC).

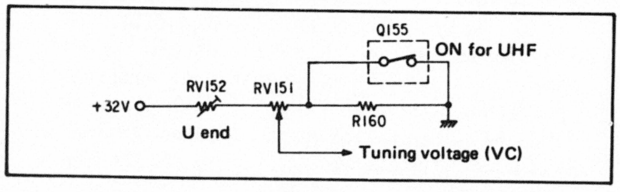


Fig. 2-5

5-3. VIF Circuit

– IC201 (M51364P) Internal Circuitry –

5-3. VIF Circuit

– IC201 (M51364P) Internal Circuitry –

The VIF circuit amplifies and detects the IF signal obtained from the tuner and performs AGC deteciton.

The IF isngnal output from the tuner passes C202 coupling capacitor and enters IC201 (M51364P) pin ⑲ . The VIF amp in IC201 is a 3-stage single amp structure, cascode connection. The VIF amp 3rd stage collector corresponds to pin ④ , and VIF output is obtained here. The collector load connected to pin ④ is composed as an LC single tuning circuit and improves IF band response.

The amplified VIF signal passes C207 coupling capacitor and is input to pin ⑥ , then sync detected at the video detection circuit inside IC201. The tuning circuit composed of L203, C210, C213 is for the limiter amp of the carrier wave applied to the multiplier, and tunes to fp=58.75 (MHz). The sync detected video signal next passes through the video drive stage. Then video output signals are extracted from pins ⑪ and ⑬ . Here, pin ⑪ corresponds to the video drive stage collector, and pin ⑬ corresponds to the emitter. Therefore, the circuit operates as an emitter-follower, and the video signal is applied from this emitter (pin ⑬) to Q301 (video buffer amp), SIF circuit, and pin ⑫ AGC detection circuit.

AGC is the peak type AGC system. The video signal applied to pin ⑫ is input to the differential amp inside IC201. Reference voltage for AGC control is applied to pin ⑨ . The AGC signal output from the differential amp is output to pin ⑤ . Then it is integrated by C208, passes Q202 AGC amp and is input to pin ⑦ . This AGC voltage is applied as IF AGC to VIF circuit 1st and 2nd stage amps, and also input to RF AGC delay circuit. This operates as a comparator, and divides 32V with R214 and RV201, and applies reference voltage to pin ② . Pin ① has an AGC buffer amp by Q201, so that the tuner RF AGC circuit can be sufficiently driven by this RF AGC output.

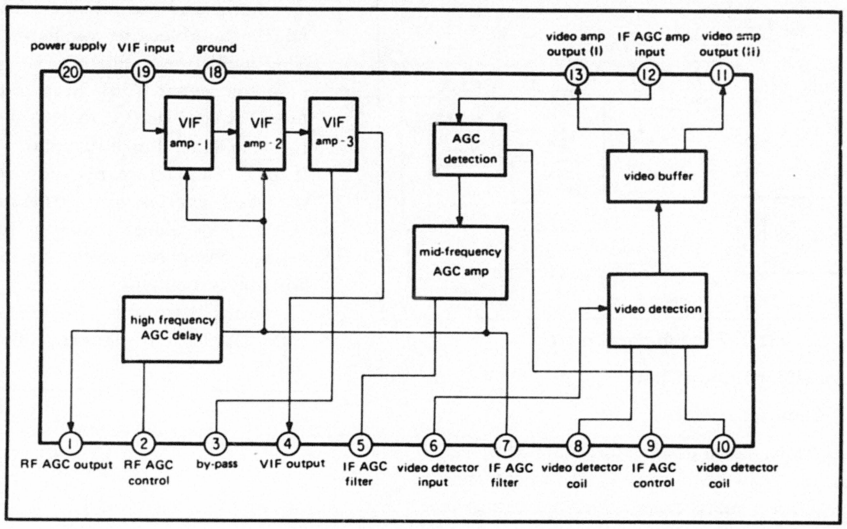


Fig. 3-1 IC201 (M51364P) Block Diagram

5-4. Video Output Circuit

The composite video signal from IC201 enters the next stage video output circuit.

Q301 is a buffer, because there is a VIDEO IN pin from outside in the video circuit.

Conventional TVs are cathode driven, but FD-20A has G1 drive, and phase inversion is necessary, so Q302 is inserted, and the horizontal blanking pulse is applied to this emitter.

Q303 is video output drive and Q401 becomes video output, and the video signal is further inverted here and applied to CRT G1. The vertical blanking pulse is applied to Q401 emitter via Q555 pulse amp.

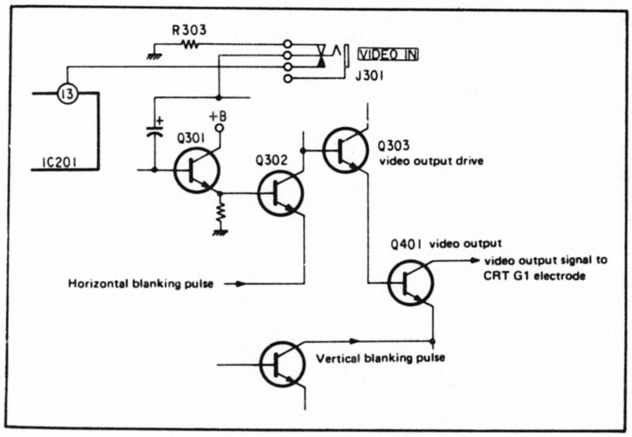


Fig. 4-1

5-5. SIF and Audio Circuit

The SIF circuit extracts, amplifies and detects and frequency different of 4.5MHz between the audio signal carrier wave (fs) and the video signal carrier wave (fp) included in the video output signal.

The 4.5MHz SIF signal is extracted at the selection element composed of CF251 and T251, is input to IC251 pin ⑧ and enters the limiter amp circuit. The SIF signal which was amplified in the limiter amp circuit is sent to the peak differential detection circuit. This circuit uses the difference between the peak voltages at the input and output sides of the tuning circuit composed of C257 and L251.

The audio signal detected in this way is output to pin ③ , passes the deemphasis circuit composed of R255 and C257, and inputs to power amp IC451. Then after being amplified, it is sent to the speaker. Q251 and Q252 compose an audio muting circuit. When a video signal is input to J301, the bias voltage from IC201 pin ⑬ is cut. Q251 goes off and Q252 goes on. Therefore audio output is muted, and regular broadcast signal audio will not come out during video signal input. R257, C259 are to integrate and flatten the video signal.

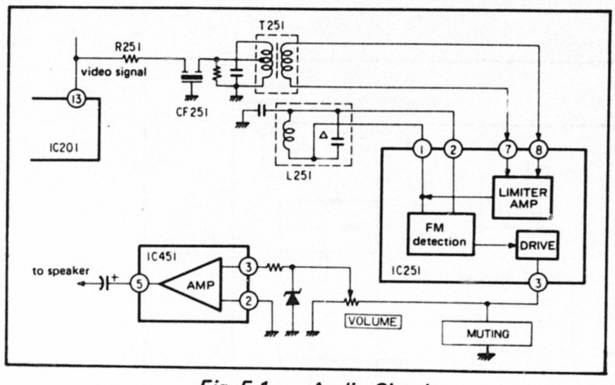


Fig. 5-1 Audio Circuit

5-6. Horizontal Deflection Circuit

5-6-1. AFC Circuit

The sync separated signal passes C503 and is supplied to D501 anode. A sawtooth wave formed by integrating the comparison pulse from converter output is applied to D501 cathode.

These two signals set the time that D501 is on. D501 operation ON time becomes long for the diode on side 1 when the comparison pulse frequency is low relative to the sync signal, and side 2 becomes short. Therefore C503 (negative potential) becomes small and C504 (positive potential) becomes large, and point A DC potential rises.

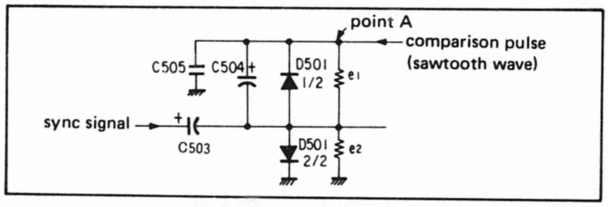


Fig. 6-1 AFC Circuit

On the other hand, when the comparison pulse frequency is high relative to the sync signal, point A DC potential drops. This point A voltage becomes AFC output voltage, and controls the horizontal oscillation circuit oscillation frequency in the next stage.

5-6-2. Horizontal Oscillation Circuit

The horizontal oscillation circuit consists of a modified Hartley blocking oscillator centering on Q502. The oscillation frequency is determined by Q502 base voltage and T501. Because there is no horizontal hold VR on FD-20A, there is a compensation circuit for stabilizing the horizontal oscillation frequency. It is a temperature response compensation circuit, so Q502 emitter has a thermistor, TH501. Also, D502 (3.9V Zener diode) is provided for reduced voltage response compensation. Because of this, horizontal oscillation frequency stability is maintained, during battery use, to minimum voltage 4.0V – 3.6V. Oscillation frequency adjustment is performed by T501.

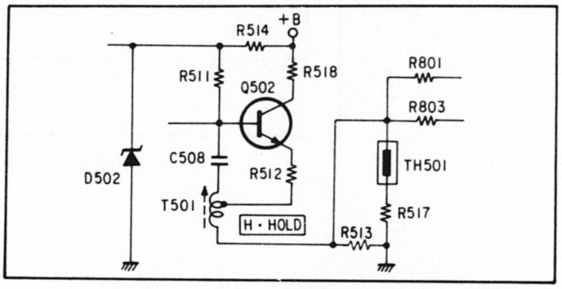


Fig. 6-2 Horizontal Oscillation Circuit

5-6-3. Horizontal Output Circuit

The oscillation output extracted from horizontal oscillation circuit Q502 emitter circuit drives at the drive circuit composed of Q801 and is supplied to Q802 in the horizontal output circuit. Horizontal oscillation output is also supplied to converter drive Q803 and is driven. This output is supplied to converter out Q804 and the flyback transformer is driven by this output.

The diode effect between Q805 base and collector is utilized as a damper.

Horizontal output Q802 is connected to the horizontal deflection yoke and supplies deflection current. Also, T802, which is connected parallel to the horizontal deflection yoke, is provided to improve damper response.

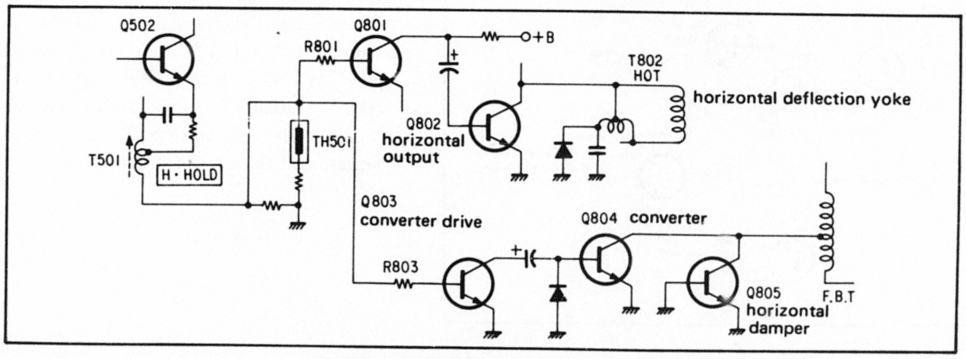


Fig. 6-3 Horizontal Output Circuit

5-7. Blanking Circuit

Vertical deflection signal blanking is performed by using the vertical deflection yoke + side (C559 side) signal. The signal for vertical blanking is blanking amped at Q555 and applied to Q401.
The signal for horizontal blanking uses the horizontal output circuit Q802 collector pulse, passes R805, D553 and is applied to Q302.

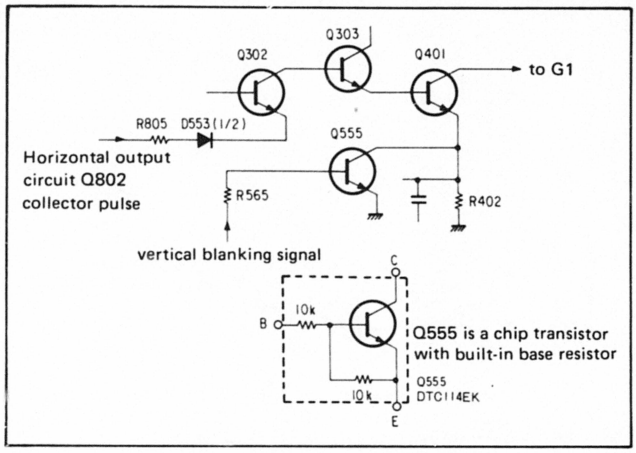


Fig. 7-1 Blanking Circuit

5-8. Keystone Correction Circuit

On a deflecting type CRT, the time until electron beam landing is different for the beginning and end of vertical deflection, so the top widens, as shown in Figure 8-1. This is called keystone, as it resembles the keystone of an arch.
Vertical deflection current is used to correct this. The vertical deflection signal obtained from the vertical deflection yoke pin passes C851 and is sent to the op amp circuit composed of Q851 and Q852. It receives integrated waveform correction at the op amp and phase inversion is performed at Q853. The phase inverted correction signal is supplied to Darlington connected Q854 and Q856.
Here, the signal obtained on Q856 emitter is supplied to the horizontal output circuit connected with a sawtooth wave with DC bias applied, and performs correction. Keystone correction amount is controlled by RV851 and horizontal size adjustment is performed by RV852.

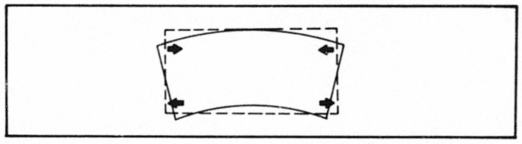


Fig. 8-1 Keystone Correction

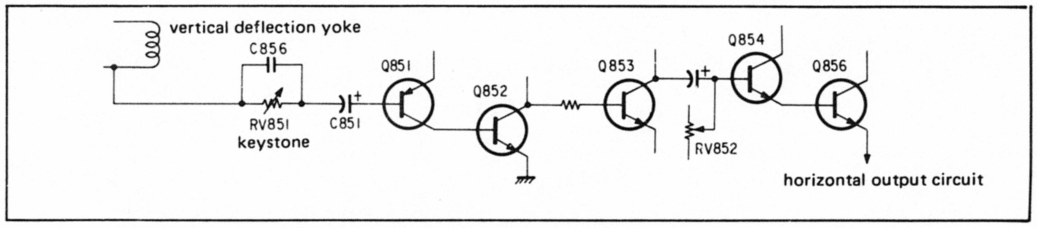


Fig. 8-2 Keystone Correction Circuit

5-9. Dynamic Focus Circuit

Dynamic focus operation is performed by using the sawtooth wave output at keystone correction circuit Q853 collector. This sawtooth wave is amplified to about 20Vp-p at the Q855 inversion amp, passes C811, and is applied to CRT G3 electrode as dynamic focus voltage.
Focus adjustment is performed by RV801.

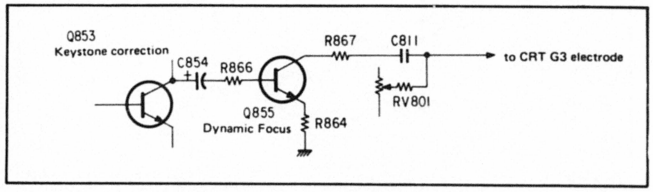


Fig. 9-1 Dynamic Focus Circuit

SEE ADDITIONAL INFORMATION

5-10. Flyback Transformer

There are 5 types of flyback transformer output voltage: +8V, +43V, +650, +0.6V and +5.2kV. +8V is used in the keystone correction circuit, +43V in the tuning voltage, video out voltage and keystone correction circuti, and dynamic focus circuit.

Focus (G3) voltage and G2 voltage are made from +650V output by the bleeder circuit composed of RV801, R808, RV802 and R809.

+0.6V is for CRT heater power supply and cathode bias voltage is applied to R404, R405 and R406 bleeder circuit.

+5.2kV is for applying electronic field so that CRT electron beam can flow at high voltage.

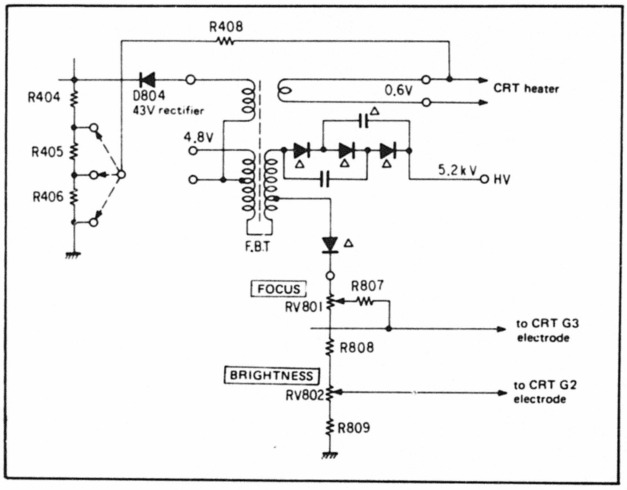


Fig. 10-1

5-11. Power Supply Circuit

The power supply circuit is a 2-transistor series regulator, PNP collector output type. This output is +4.8V, but +6V is supplied directly to the audio circuit for extra sound quality and volume.

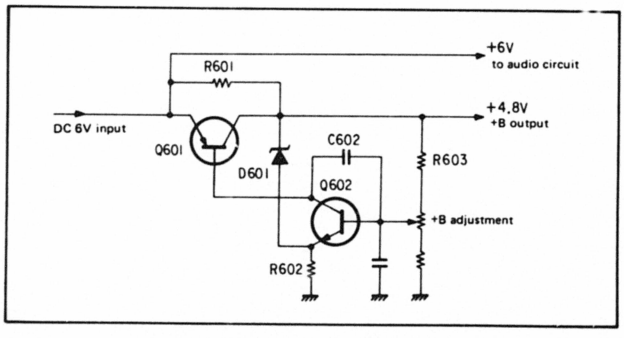


Fig. 11-1 Power Supply Circuit

No.	Part No.	Description	Remark
1	3-314-015-00	FILTER (CANADIAN,E)	
	3-314-061-01	FILTER (US)	
2	3-314-028-11	FRAME, PICTURE	
3	3-314-018-00	SHEET (A), ORNAMENTAL	
4	3-314-019-00	SHEET (B), ORNAMENTAL	
5	X-3314-007-1	CABINET (UPPER) ASSY (E)	
	X-3314-008-1	CABINET (UPPER) ASSY (CANADIAN)	
	X-3314-014-1	CABINET (UPPER), FOR BLUE	(US)
	X-3314-015-1	CABINET (UPPER), FOR SILVER	(US)
	X-3314-016-1	CABINET (UPPER) ASSY, FOR GIANTS	(US)
	X-3314-017-1	CABINET (UPPER) ASSY, FOR JETS	(US)
	X-3314-018-1	CABINET (UPPER) ASSY, FOR EAGLES	(US)
	X-3314-019-1	CABINET (UPPER) ASSY, FOR COWBOYS	(US)
	X-3314-020-1	CABINET (UPPER) ASSY, FOR DOLPHINS	(US)
	X-3314-021-1	CABINET (UPPER) ASSY, FOR 49ERS	(US)
	X-3314-022-1	CABINET (UPPER) ASSY, FOR BEARS	(US)
	X-3314-023-1	CABINET (UPPER) ASSY, FOR RAMS	(US)
	X-3314-024-1	CABINET (UPPER) ASSY, FOR RAIDERS	(US)
	X-3314-025-1	CABINET (UPPER) ASSY, FOR OILERS	(US)
	X-3314-026-1	CABINET (UPPER) ASSY, FOR BROWNS	(US)
	X-3314-027-1	CABINET (UPPER) ASSY, FOR LIONS	(US)
	X-3314-028-1	CABINET (UPPER) ASSY, FOR PATRIOTS	(US)
6	3-314-010-00	BRACKET, STRAP	
7	♦:3-314-011-00	INDICATOR, CONTROL	
8	3-314-012-00	SHAFT, DIAL	
9	3-314-013-01	KNOB, TUNING, FOR SILVER (US,E)	
	3-314-013-11	KNOB, TUNING, FOR BLUE (US,CANADIAN)	
10	3-569-403-00	RETAINER, LEVER	
11	9-911-825-32	STRING DIAL 0.3DIA	
12	3-314-008-00	POINTER	
13	3-314-007-00	DRUM, DIAL	
14	3-314-016-00	PLATE (A), NUT	
15	3-314-027-01	KNOB (A), SLIDE, FOR SILVER (US,E)	
	3-314-027-11	KNOB (A), SLIDE, FOR BLUE (US,CANADIAN)	
16	0-435-672-00	CLOTH, DRAWER, BATTERY	
17	3-314-050-00	LABEL, CAUTION, POWER (US)	
18	8-927-139-00	SPEAKER UNIT (030F011)	
19	♦:1-610-898-00	EJ BOARD	
20	♦:3-314-059-00	HOLDER, SPEAKER	
21	⚠:8-735-951-00	CRT (02JM)	
22	♦:X-3314-002-	HOLDER ASSY, B TUBE	
23	⚠:1-451-229-00	DEFLECTION YOKE	
24	♦:1-526-736-00	SOCKET, CRT	
25	♦:1-610-103-00	C BOARD	
26	1-439-309-00	TRANSFORMER ASSY, FLYBACK	
27	♦:1-610-897-00	D BOARD	
28	3-314-014-00	SCREW FILTER (CANADIAN,E)	
	3-314-055-00	SCREW (M1.4), PIN-FACE (US)	
29	3-314-002-00	STRIP, ORNAMENTAL	
30	3-314-017-00	PLATE (B), NUT	
31	9-911-844-XX	RUBBER, BRAKE	
32	3-489-108-00	WASHER, NYLON	
33	3-314-005-01	CUSHION, SPEAKER (CANADIAN,E)	
	3-314-005-11	CUSHION, SPEAKER (US)	
34	3-314-062-00	LABEL, CAUTION SERVICE (US)	
35	4-875-562-00	SPRING, TENSION	
36	3-831-441-XX	CUSHION	
37	♦:3-576-954-00	RETAINER, SOLENOID	
38	3-527-126-00	MARK, BATTERY CASE	
39	3-314-056-00	INSULATOR (US)	
40	3-309-597-31	SCREW (1.4), TAPPING, PRECISION	

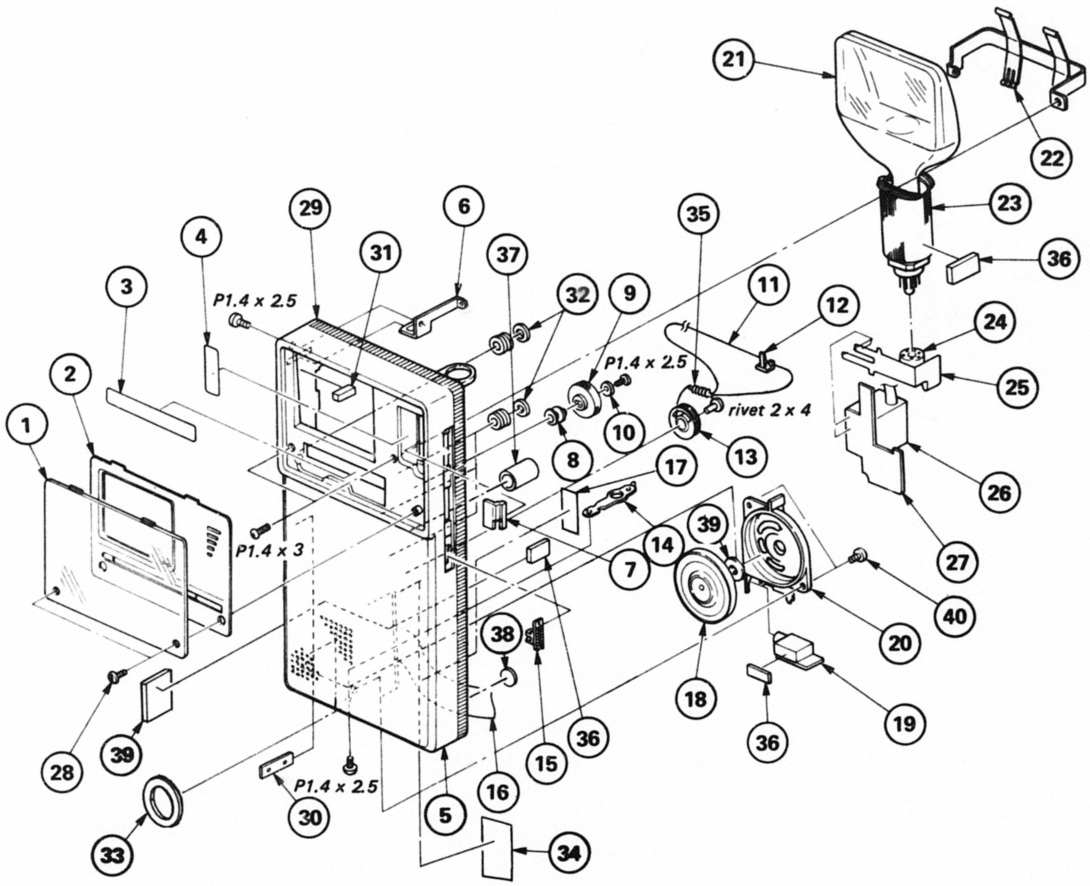
SEE ADDITIONAL INFORMATION

SECTION 6
EXPLODED VIEWS

(1) CABINET (UPPER)

SCREW

7-627-850-17 SCREW, PRECISION +P 1.4X2.5, FOR SILVER (US,E)
7-627-850-18 SCREW, PRECISION +P 1.4X2.5, FOR BLUE (US,CANADIAN)
7-627-850-27 SCREW, PRECISION +P 1.4X3



NOTE:
- Items with no part number and no description are not stocked because they are seldom required for routine service.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked " ♦ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

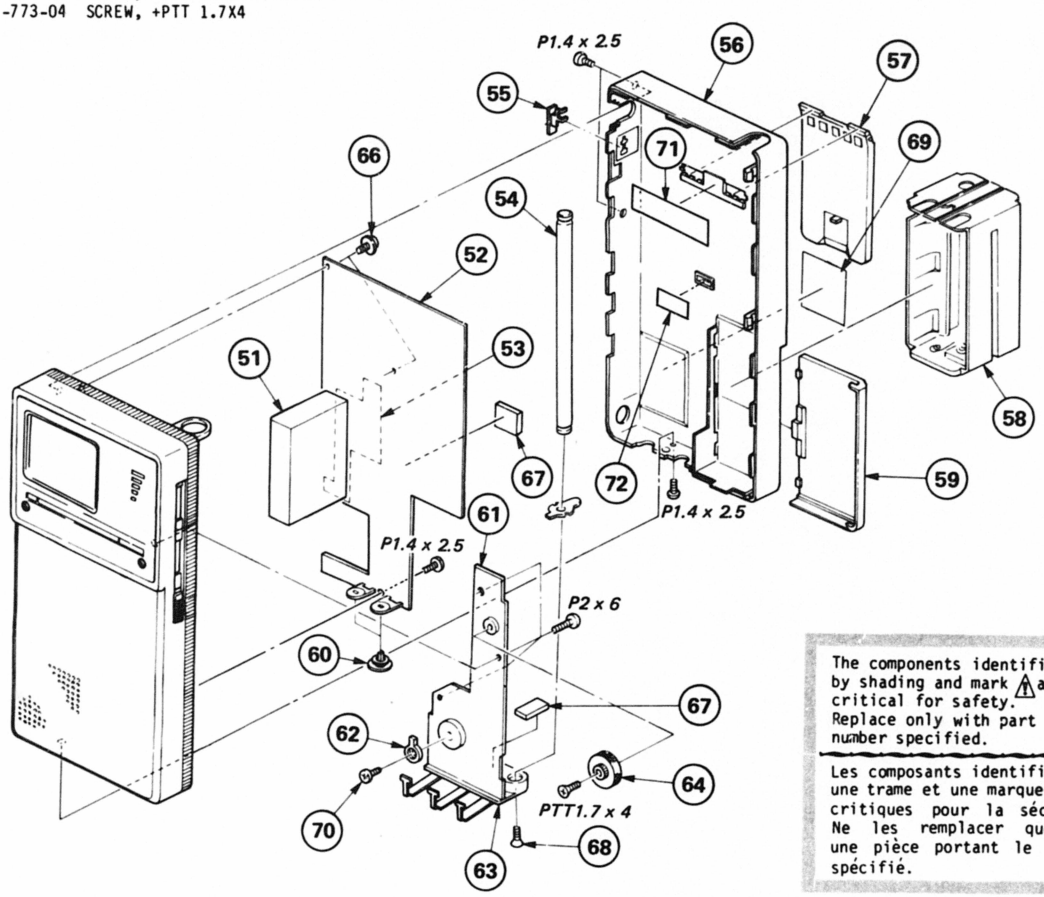
Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

(2) CABINET (LOWER)

SEE ADDITIONAL INFORMATION

SCREW

7-685-104-11 SCREW +P 2X6 TYPE2 NON-SLIT
7-627-850-17 SCREW, PRECISION +P 1.4X2.5, FOR SILVER (US,E)
7-627-850-18 SCREW, PRECISION +P 1.4X2.5, FOR BLUE (US,CANADIAN)
7-627-850-27 SCREW, PRECISION +P 1.4X3
7-685-773-04 SCREW, +PTT 1.7X4



The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

No.	Part No.	Description	Remark
51	⚠1-463-479-00	TUNER UNIT (UHF/VHF) (BT-838)	
52	♦:A-3015-195-A	A BOARD, COMPLETE	
53	♦:1-610-899-00	S BOARD	
54	1-501-278-00	ANTENNA, TELESCOPIC	
55	3-314-039-01	KNOB (B), SLIDE, FOR SILVER (US,E)	
	3-314-039-11	KNOB (B), SLIDE, FOR BLUE (US,CANADIAN)	
56	3-314-033-01	CABINET (LOWER) (E)	
	3-314-033-11	CABINET (LOWER) (CANADIAN)	
	3-314-033-21	CABINET (LOWER), FOR SILVER (US)	
	3-314-033-31	CABINET (LOWER), FOR BLUE (US)	
57	3-314-029-03	STAND, FOR SILVER (US,E)	
	3-314-029-11	STAND (CANADIAN)	
	3-314-029-21	STAND, FOR BLUE (US)	
58	X-3314-011-0	HOLDER ASSY, BATTERY (US)	
	X-3564-820-1	HOLDER ASSY, BATTERY (CANADIAN,E)	
59	3-314-023-01	LID, BATTERY CASE (E)	
	3-314-023-11	LID, BATTERY CASE (CANADIAN)	
	3-314-023-21	LID, BATTERY CASE, FOR SILVER (US)	
	3-314-023-31	LID, BATTERY CASE, FOR BLUE (US)	
60	3-314-022-01	KNOB, ADJUSTMENT, FOR SILVER(US,CANADIAN)	
	3-314-022-11	KNOB, ADJUSTMENT, FOR BLUE (US,E)	

No.	Part No.	Description	Remark
61	♦:A-3089-051-A	K BOARD, COMPLETE	
62	3-314-006-00	TUNING JOINT	
63	X-3314-005-1	HOLDER, PIECE, CONTACT, BATTERY SUB ASSY	(E)
	X-3314-006-1	HOLDER, PIECE, CONTACT, BATTERY SUB ASSY	(CANADIAN)
	X-3314-013-1	HOLDER, PIECE, CONTACT, BATTERY SUB ASSY	FOR,SILVER
	X-3314-012-1	HOLDER, PIECE, CONTACT, BATTERY SUB ASSY	FOR,BLUE
64	3-314-026-01	KNOB VOLUME (SILVER) (US,E)	
	3-314-026-11	KNOB VOLUME (BLUE) (US,CANADIAN)	
65	X-3314-010-0	CABINET (LOWER) ASSY	56,57,58,59
66	3-703-502-21	SCREW	
67	3-314-057-00	CUSHION	
68	3-680-705-11	SCREW (M2.6X5)	
69	3-527-213-00	LABEL, SERIAL NUMBER	
70	3-888-156-00	SCREW (1.7X4)	
71	♦:3-314-065-00	SHEET (A), PROTECTION	
72	♦:3-314-066-00	SHEET (B), PROTECTION	

SEE ADDITIONAL INFORMATION

SECTION 7
ELECTRICAL PARTS LIST

A

NOTE:

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

• Items marked " ♦ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

• All variable and adjustable resistors have characteristic curve B, unless otherwise noted.

CAPACITORS
• MF : μF, PF : μμF

RESISTORS
• All resistors are in ohms
• F : nonflammable

COILS
• MMH : mH, UH : μH

1/5

Ref.No.	Part No.	Description		Remark
	♦:A-3015-195-A	A BOARD, COMPLETE **********		
	1-131-385-00	TANTALUM 22MF	20%	6.3V
	1-131-417-00	TANTALUM 3.3MF	20%	16V
	1-226-430-00	RES, ADJ, CARBON 5K		
	1-226-435-00	RES, ADJ, CARBON 200K		
	3-314-043-00	MASK		
	♦:3-314-051-00	CLAMP, LEAD		
	3-314-057-00	CUSHION		
		CAPACITOR		
C153	1-163-031-00	CERAMIC CHIP 0.01MF		50V
C158	1-163-031-00	CERAMIC CHIP 0.01MF		50V
C159	1-163-027-00	CERAMIC CHIP 0.0022MF		50V
C201	1-163-031-00	CERAMIC CHIP 0.01MF		50V
C202	1-163-205-00	CERAMIC CHIP 0.001MF	5%	50V
C203	1-124-224-00	ELECT 47MF	20%	6.3V
C204	1-163-031-00	CERAMIC CHIP 0.01MF		50V
C205	1-163-027-00	CERAMIC CHIP 0.0022MF		50V
C206	1-163-121-00	CERAMIC CHIP 150PF	5%	50V
C207	1-163-141-00	CERAMIC CHIP 0.001MF	5%	50V
C208	1-131-343-00	TANTALUM 0.22MF	20%	35V
C209	1-124-237-00	ELECT 3.3MF	20%	25V
C210	1-163-114-00	CERAMIC CHIP 75PF	5%	50V
C211	1-163-027-00	CERAMIC CHIP 0.0022MF		50V
C212	1-131-387-00	TANTALUM 47MF	20%	6.3V
C213	1-163-087-00	CERAMIC CHIP 4PF	0.25PF	50V
C251	1-163-109-00	CERAMIC CHIP 47PF	5%	50V
C252	1-163-031-00	CERAMIC CHIP 0.01MF		50V
C253	1-124-224-00	ELECT 47MF	20%	6.3V
C254	1-163-351-00	CERAMIC CHIP 8PF	0.25PF	50V
C255	1-163-031-00	CERAMIC CHIP 0.01MF		50V
C256	1-124-133-00	ELECT 220MF	20%	6.3V
C257	1-163-078-00	CERAMIC CHIP 0.033MF	10%	25V
C258	1-131-347-00	TANTALUM 1MF	20%	35V
C259	1-124-222-00	ELECT 22MF	20%	6.3V
C301	1-163-129-00	CERAMIC CHIP 330PF	5%	50V
C302	1-123-617-00	ELECT 10MF	20%	16V
C303	1-163-031-00	CERAMIC CHIP 0.01MF		50V
C401	1-163-129-00	CERAMIC CHIP 330PF	5%	50V
C402	1-124-413-00	ELECT 220MF	20%	4V
C403	1-163-123-00	CERAMIC CHIP 180PF	5%	50V
C405	1-163-076-00	CERAMIC CHIP 0.068MF		50V
C501	1-163-078-00	CERAMIC CHIP 0.033MF	10%	25V
C502	1-131-418-00	TANTALUM 1MF	20%	10V
C503	1-163-057-00	CERAMIC CHIP 0.0068MF	10%	50V
C504	1-163-055-00	CERAMIC CHIP 0.0047MF	10%	50V
C505	1-163-061-00	CERAMIC CHIP 0.015MF	10%	50V
C506	1-131-417-00	TANTALUM 3.3MF	20%	16V
C507	1-131-402-00	TANTALUM 0.1MF	20%	35V
C508	1-108-583-00	MYLAR 0.015MF	5%	50V
C509	1-130-497-00	MYLAR 0.15MF	5%	50V
C510	1-124-222-00	ELECT 22MF	20%	6.3V
C511	1-124-255-00	ELECT 1MF	20%	50V
C512	1-124-225-00	ELECT 100MF	20%	6.3V
C513	1-163-125-00	CERAMIC CHIP 220PF	5%	50V
C514	1-163-141-00	CERAMIC CHIP 0.001MF	5%	50V
C551	1-163-078-00	CERAMIC CHIP 0.033MF	10%	25V
C552	1-163-080-00	CERAMIC CHIP 0.047MF	10%	25V
C553	1-163-078-00	CERAMIC CHIP 0.033MF	10%	25V
C554	1-163-064-00	CERAMIC CHIP 0.027MF	10%	50V
C555	1-131-501-00	TANTALUM 3.3MF	10%	10V
C556	1-124-223-00	ELECT 33MF	20%	6.3V
C557	1-131-386-00	TANTALUM 33MF	20%	6.3V
C558	1-163-125-00	CERAMIC CHIP 220PF	5%	50V
C559	1-124-133-00	ELECT 220MF	20%	6.3V
C560	1-163-037-00	CERAMIC CHIP 0.022MF	10%	25V
C561	1-131-423-00	TANTALUM 6.8MF	20%	6.3V
C562	1-124-225-00	ELECT 100MF	20%	6.3V
C563	1-131-385-00	TANTALUM 22MF	20%	6.3V
C604	1-163-205-00	CERAMIC CHIP 0.001MF	5%	50V
C801	1-131-349-00	TANTALUM 2.2MF	20%	35V
C802	1-106-214-00	MYLAR 0.056MF	5%	100V
C803	1-131-387-00	TANTALUM 47MF	20%	6.3V
C804	1-131-349-00	TANTALUM 2.2MF	20%	35V
C805	⚠1-106-208-00	MYLAR 0.033MF	5%	100V
C806	1-124-261-00	ELECT 10MF	20%	50V
C808	1-123-617-00	ELECT 10MF	20%	16V
C813	1-163-125-00	CERAMIC CHIP 220PF	5%	50V
C814	1-163-141-00	CERAMIC CHIP 0.001MF	5%	50V
C851	1-124-222-00	ELECT 22MF	20%	6.3V
C852	1-131-409-00	TANTALUM 0.33MF	20%	25V
C853	1-124-227-00	ELECT 10MF	20%	10V
C854	1-131-349-00	TANTALUM 2.2MF	20%	35V
C855	1-124-225-00	ELECT 100MF	20%	6.3V
C856	1-163-076-00	CERAMIC CHIP 0.068MF		50V
C857	1-163-059-00	CERAMIC CHIP 0.01MF	10%	50V
C858	1-163-051-00	CERAMIC CHIP 0.0022MF	10%	50V
		FILTER		
CF251	1-567-115-00	FILTER, CERAMIC		
CF301	1-409-370-00	TRAP, CERAMIC 4.5MHZ		
		CONNECTOR		
CN601	1-507-563-00	D C JACK		
		DIODE		
D201	8-719-911-19	DIODE 1SS119		
D501	8-719-100-03	DIODE 1S2835		
D502	8-719-100-20	DIODE RD3.9EB1		
D551	8-719-815-55	DIODE 1S1555		
D552	8-719-815-55	DIODE 1S1555		
D553	8-719-100-50	DIODE 1S2837		
D801	8-719-911-19	DIODE 1SS119		

A

SEE ADDITIONAL INFORMATION

2

Ref.No.	Part No.	Description	Remark
D802	8-719-908-06	DIODE ERA81-005	
D803	8-719-911-19	DIODE 1SS119	
D804	8-719-101-23	DIODE 1SS123	
D806	8-719-911-19	DIODE 1SS119	
D807	⚠ 8-719-102-81	DIODE RD7.5EN2	
D808	⚠ 8-719-102-81	DIODE RD7.5EN2	
D851	8-719-101-23	DIODE 1SS123	
		IC	
IC151	8-759-400-03	IC AN5700	
IC152	8-759-157-41	IC UPC574J-G	
IC201	8-759-600-13	IC M51364P	
IC251	8-759-600-46	IC M51378L	
		JACK	
J301	1-507-862-00	JACK, VIDEO IN	
		CHIP JUMPER	
JR153	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR154	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR201	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR202	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR301	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR302	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR501	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR502	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR503	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR504	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR505	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR506	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR552	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR553	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR801	1-216-296-00	METAL CHIP 0 5% 1/8W	
		COIL	
L202	1-459-462-00	COIL (WITH CORE)	
L202	1-459-462-21	COIL (WITH CORE)	
L203	1-404-446-00	COIL, VIF DETECTOR	
L251	1-404-387-00	COIL, FM DETECTOR	
L501	1-408-098-00	MICRO INDUCTOR 560UH	
L551	1-408-088-00	MICRO INDUCTOR 220UH	
L801	1-408-121-00	MICRO INDUCTOR 22UH	
		TRANSISTOR	
Q155	8-729-100-66	TRANSISTOR 2SC1623	
Q201	8-729-100-66	TRANSISTOR 2SC1623	
Q202	8-729-100-66	TRANSISTOR 2SC1623	
Q251	8-729-100-66	TRANSISTOR 2SC1623	
Q252	8-729-100-66	TRANSISTOR 2SC1623	
Q301	8-729-100-66	TRANSISTOR 2SC1623	
Q302	8-729-100-66	TRANSISTOR 2SC1623	
Q303	8-729-100-66	TRANSISTOR 2SC1623	
Q401	8-729-100-66	TRANSISTOR 2SC1623	

Ref.No.	Part No.	Description	Remark
Q501	8-729-100-76	TRANSISTOR 2SA812	
Q502	8-729-100-67	TRANSISTOR 2SC1623-L7	
Q551	8-729-100-66	TRANSISTOR 2SC1623	
Q552	8-729-100-66	TRANSISTOR 2SC1623	
Q553	8-729-159-64	TRANSISTOR 2SD596	
Q554	8-729-102-44	TRANSISTOR 2SB624	
Q555	8-729-900-53	TRANSISTOR DTC114EK	
Q801	8-729-271-23	TRANSISTOR 2SC2712	
Q802	8-729-300-31	TRANSISTOR 2SD763	
Q803	8-729-271-23	TRANSISTOR 2SC2712	
Q804	8-729-300-31	TRANSISTOR 2SD763	
Q805	8-729-103-72	TRANSISTOR 2SD1005	
Q851	8-729-100-76	TRANSISTOR 2SA812	
Q852	8-729-100-66	TRANSISTOR 2SC1623	
Q853	8-729-159-64	TRANSISTOR 2SD596	
Q854	8-729-159-64	TRANSISTOR 2SD596	
Q855	8-729-103-16	TRANSISTOR 2SC1622A	
Q856	8-729-199-92	TRANSISTOR 2SD999	
		RESISTOR	
R158	1-216-086-00	METAL CHIP 36K 5% 1/10W	
R159	1-216-105-00	METAL CHIP 220K 5% 1/10W	
R160	1-216-057-00	METAL CHIP 2.2K 5% 1/10W	
R201	1-216-032-00	METAL CHIP 200 5% 1/10W	
R203	1-216-029-00	METAL CHIP 150 5% 1/10W	
R204	1-216-081-00	METAL CHIP 22K 5% 1/10W	
R205	1-216-073-00	METAL CHIP 10K 5% 1/10W	
R206	1-216-072-00	METAL CHIP 9.1K 5% 1/10W	
R207	1-216-039-00	METAL CHIP 390 5% 1/10W	
R208	1-216-069-00	METAL CHIP 6.8K 5% 1/10W	
R209	1-216-027-00	METAL CHIP 120 5% 1/10W	
R210	1-216-077-00	METAL CHIP 15K 5% 1/10W	
R211	1-216-059-00	METAL CHIP 2.7K 5% 1/10W	
R213	1-216-092-00	METAL CHIP 62K 5% 1/10W	
R214	1-216-101-00	METAL CHIP 150K 5% 1/10W	
R251	1-216-198-00	METAL CHIP 1K 5% 1/8W	
R252	1-216-049-00	METAL CHIP 1K 5% 1/10W	
R254	1-216-166-00	METAL CHIP 47 5% 1/8W	
R255	1-216-073-00	METAL CHIP 10K 5% 1/10W	
R257	1-216-094-00	METAL CHIP 75K 5% 1/10W	
R258	1-216-065-00	METAL CHIP 4.7K 5% 1/10W	
R301	1-216-051-00	METAL CHIP 1.2K 5% 1/10W	
R302	1-216-022-00	METAL CHIP 75 5% 1/10W	
R303	1-216-022-00	METAL CHIP 75 5% 1/10W	
R304	1-216-078-00	METAL CHIP 16K 5% 1/10W	
R305	1-216-079-00	METAL CHIP 18K 5% 1/10W	
R306	1-216-049-00	METAL CHIP 1K 5% 1/10W	
R307	1-216-055-00	METAL CHIP 1.8K 5% 1/10W	
R308	1-216-051-00	METAL CHIP 1.2K 5% 1/10W	
R309	1-216-053-00	METAL CHIP 1.5K 5% 1/10W	
R401	1-216-073-00	METAL CHIP 10K 5% 1/10W	
R402	1-216-051-00	METAL CHIP 1.2K 5% 1/10W	
R403	1-216-049-00	METAL CHIP 1K 5% 1/10W	

NOTE:

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SEE ADDITIONAL INFORMATION

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Ref.No.	Part No.	Description				Remark
R404	1-216-105-00	METAL CHIP	220K	5%	1/10W	
R405	1-216-101-00	METAL CHIP	150K	5%	1/10W	
R406	1-216-106-00	METAL CHIP	240K	5%	1/10W	
R408	1-216-129-00	METAL CHIP	2.2M	5%	1/10W	
R409	1-216-051-00	METAL CHIP	1.2K	5%	1/10W	
R410	1-216-121-00	METAL CHIP	1M	5%	1/10W	
R501	1-216-027-00	METAL CHIP	120	5%	1/10W	
R502	1-216-214-00	METAL CHIP	4.7K	5%	1/8W	
R503	1-216-085-00	METAL CHIP	33K	5%	1/10W	
R504	1-216-099-00	METAL CHIP	120K	5%	1/10W	
R505	1-216-196-00	METAL CHIP	820	5%	1/8W	
R506	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R507	1-216-059-00	METAL CHIP	2.7K	5%	1/10W	
R508	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R509	1-216-196-00	METAL CHIP	820	5%	1/8W	
R510	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R511	1-216-077-00	METAL CHIP	15K	5%	1/10W	
R512	1-216-009-00	METAL CHIP	22	5%	1/10W	
R513	1-216-180-00	METAL CHIP	180	5%	1/8W	
R514	1-216-018-00	METAL CHIP	51	5%	1/10W	
R515	1-216-205-00	METAL CHIP	2K	5%	1/8W	
R516	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R517	1-216-186-00	METAL CHIP	330	5%	1/8W	
R518	1-216-025-00	METAL CHIP	100	5%	1/10W	
R551	1-216-072-00	METAL CHIP	9.1K	5%	1/10W	
R552	1-216-075-00	METAL CHIP	12K	5%	1/10W	
R553	1-247-867-00	CARBON	33K	5%	1/6W	
R554	1-216-045-00	METAL CHIP	680	5%	1/10W	
R555	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R556	1-216-302-00	METAL CHIP	2.7	5%	1/10W	
R557	1-216-156-00	METAL CHIP	18	5%	1/8W	
R558	1-216-072-00	METAL CHIP	9.1K	5%	1/10W	
R559	1-216-086-00	METAL CHIP	36K	5%	1/10W	
R560	1-216-053-00	METAL CHIP	1.5K	5%	1/10W	
R561	1-216-051-00	METAL CHIP	1.2K	5%	1/10W	
R562	1-216-310-00	METAL CHIP	6.2	5%	1/10W	
R563	1-216-044-00	METAL CHIP	620	5%	1/10W	
R564	1-216-045-00	METAL CHIP	680	5%	1/10W	
R565	1-216-053-00	METAL CHIP	1.5K	5%	1/10W	
R566	1-216-298-00	METAL CHIP	2.2	5%	1/10W	
R567	1-216-298-00	METAL CHIP	2.2	5%	1/10W	
R801	1-216-184-00	METAL CHIP	270	5%	1/8W	
R802	1-216-033-00	METAL CHIP	220	5%	1/10W	
R803	1-216-190-00	METAL CHIP	470	5%	1/8W	
R804	1-216-033-00	METAL CHIP	220	5%	1/10W	
R805	1-216-075-00	METAL CHIP	12K	5%	1/10W	
R806	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R812 ⚠	1-216-190-00	METAL CHIP	470	5%	1/8W	
R813 ⚠	1-216-190-00	METAL CHIP	470	5%	1/8W	
R851	1-216-222-00	METAL CHIP	10K	5%	1/8W	
R852	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R853	1-216-079-00	METAL CHIP	18K	5%	1/10W	
R854	1-216-079-00	METAL CHIP	18K	5%	1/10W	

Ref.No.	Part No.	Description				Remark
R855	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R856	1-216-092-00	METAL CHIP	62K	5%	1/10W	
R857	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R858	1-216-041-00	METAL CHIP	470	5%	1/10W	
R859	1-216-099-00	METAL CHIP	120K	5%	1/10W	
R860	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R861	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R862	1-216-089-00	METAL CHIP	47K	5%	1/10W	
R863	1-216-102-00	METAL CHIP	160K	5%	1/10W	
R864	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R865	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R866	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R867	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R868	1-216-049-00	METAL CHIP	1K	5%	1/10W	

VARIABLE RESISTOR

RV152	1-230-038-00	RES, ADJ, CARBON 100K	
RV153	1-230-039-00	RES, ADJ, CARBON 200K	
RV154	1-230-037-00	RES, ADJ, CARBON 50K	
RV155	1-230-039-00	RES, ADJ, CARBON 200K	
RV201	1-230-035-00	RES, ADJ, CARBON 10K	
RV401	1-226-430-00	RES, ADJ, CARBON 5K (CONTR)	
RV551	1-226-435-00	RES, ADJ, CARBON 200K (V HOLD)	
RV552	1-230-036-00	RES, ADJ, CARBON 20K	
RV553	1-230-034-00	RES, ADJ, CARBON 1K	
RV851	1-230-036-00	RES, ADJ, CARBON 20K	
RV852	1-228-891-00	RES, ADJ, METAL GLAZE 10K	

SWITCH

S151	1-554-123-00	SWITCH, SLIDE (BAND SELECT)

TRANSFORMER

T251	1-404-459-00	SIFT
T501	1-406-051-00	COIL, HORIZONTAL OSC
T802	1-439-313-00	TRANSFORMER, HORIZONTAL OUTPUT

THERMISTOR

TH501	1-800-193-00	THERMISTOR(DIRECT-HEATING DISK
TH551	1-800-198-XX	THERMISTOR S-1K

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♦:A-3089-047-A S BOARD
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⚠1-463-479-00 TUNER UNIT (UHF/VHF), BT-838

CAPACITOR

C151	1-135-045-00	TANTAL. CHIP 0.33MF	20%	35V
C152	1-163-068-00	CERAMIC CHIP 0.0033MF		50V
C154	1-163-205-00	CERAMIC CHIP 0.001MF	5%	50V
C155	1-163-141-00	CERAMIC CHIP 0.001MF	5%	50V
C156	1-163-031-00	CERAMIC CHIP 0.01MF		50V

NOTE:

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SEE ADDITIONAL INFORMATION

Ref.No.	Part No.	Description				Remark
C160	1-163-027-00	CERAMIC CHIP	0.0022MF			50V
		CHIP JUMPER				
JR151	1-216-296-00	METAL CHIP	0	5%	1/8W	
JR152	1-216-296-00	METAL CHIP	0	5%	1/8W	
		TRANSISTOR				
Q151	8-729-100-66	TRANSISTOR 2SC1623				
Q152	8-729-100-76	TRANSISTOR 2SA812				
Q153	8-729-100-66	TRANSISTOR 2SC1623				
Q154	8-729-100-76	TRANSISTOR 2SA812				
		RESISTOR				
R151	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R152	1-216-105-00	METAL CHIP	220K	5%	1/10W	
R153	1-216-232-00	METAL CHIP	27K	5%	1/8W	
R154	1-216-214-00	METAL CHIP	4.7K	5%	1/8W	
R155	1-216-214-00	METAL CHIP	4.7K	5%	1/8W	
R156	1-216-051-00	METAL CHIP	1.2K	5%	1/10W	

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♦:1-610-896-00 K BOARD
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3-314-006-00 JOINT, TUNING
3-314-026-01 KNOB, CONTROL, FOR SILVER (US,E)
3-314-026-11 KNOB, CONTROL, FOR BLUE (US,CANADIAN)
3-888-156-00 SCREW

		CAPACITOR				
C157	1-162-111-00	CERAMIC	0.0022MF	30%	25V	
C451	1-131-419-00	TANTALUM	2.2MF	20%	10V	
C452	1-124-144-00	ELECT	220MF	20%	16V	
C453	1-124-225-00	ELECT	100MF	20%	6.3V	
C454	1-163-027-00	CERAMIC CHIP	0.0022MF		50V	
C455	1-135-052-00	TANTAL. CHIP	0.47MF	20%	25V	
C456	1-161-066-00	CERAMIC	0.0022MF	20%	50V	
C601	1-124-236-00	ELECT	47MF	20%	16V	
C602	1-163-125-00	CERAMIC CHIP	220PF	5%	50V	
C603	1-124-223-00	ELECT	33MF	20%	6.3V	
		DIODE				
D451	8-719-105-57	DIODE RD3.9M-B1				
D601 ⚠	8-719-100-16	DIODE RD3.3EB1				
		IC				
IC451	8-759-700-50	IC NJM386M				
		CHIP JUMPER				
JR601	1-216-296-00	METAL CHIP	0	5%	1/8W	

Ref.No.	Part No.	Description				Remark
		TRANSISTOR				
Q601 ⚠	8-729-177-23	TRANSISTOR 2SB772				
Q602 ⚠	8-729-100-66	TRANSISTOR 2SC1623				
		RESISTOR				
R451	1-216-045-00	METAL CHIP	680	5%	1/10W	
R452	1-247-792-00	CARBON	24	5%	1/6W	
R453	1-216-045-00	METAL CHIP	680	5%	1/10W	
R601	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R602	1-216-033-00	METAL CHIP	220	5%	1/10W	
R603 ⚠	1-216-322-91	CARBON CHIP	5.6K	1%	1/8W	
R604 ⚠	1-216-322-91	CARBON CHIP	5.6K	1%	1/8W	
		VARIABLE RESISTOR				
RV151	1-230-040-00	RES, VAR, CARBON 200K (TUNING)				
RV451	1-228-898-00	RES, VAR, CARBON 10K (VOLUME)				
RV601 ⚠	1-228-889-00	RES, ADJ, METAL GLAZE 2.2K				
		SWITCH				
S601 ⚠	1-554-123-00	SWITCH, SLIDE (POWER)				

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♦:1-610-103-00 C BOARD
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1-526-736-00 SOCKET, CRT

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♦:1-610-897-00 D BOARD
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3-303-019-00 INSULATOR (B)

		CAPACITOR				
C404	1-163-076-00	CERAMIC CHIP	0.068MF		50V	
C406	1-163-035-00	CERAMIC CHIP	0.047MF		50V	
C809	1-124-133-00	ELECT	220MF	20%	6.3V	
C810	1-162-146-00	CERAMIC	0.001MF		1KV	
C811	1-162-147-00	CERAMIC	0.0022MF		1KV	
C812	1-102-038-00	CERAMIC	0.001MF		500V	
		RESISTOR				
R807	1-202-727-00	SOLID	4.7M	10%	1/2W	
R808	1-216-280-00	METAL CHIP	2.7M	5%	1/8W	
R809	1-216-280-00	METAL CHIP	2.7M	5%	1/8W	
R810	1-216-111-00	METAL CHIP	390K	5%	1/10W	
R811	1-216-105-00	METAL CHIP	220K	5%	1/10W	
		VARIABLE RESISTOR				
RV801	1-228-573-00	RES, ADJ, CARBON 2M				
RV802	1-230-033-00	RES, ADJ, CARBON 4.7M				

NOTE:

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SEE ADDITIONAL INFORMATION

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Ref.No.	Part No.	Description				Remark
		TRANSFORMER				
T801	⚠-1-439-309-00	TRANSFORMER ASSY, FLYBACK				
**********						
	♦:1-610-898-00	EJ BOARD				
		********				
		JACK				
J901	1-507-838-00	JACK				
		RESISTOR				
R901	1-216-150-00	METAL CHIP	10	5%	1/8W	
R902	1-216-150-00	METAL CHIP	10	5%	1/8W	
R903	1-216-009-00	METAL CHIP	22	5%	1/10W	
**********						
		MISCELLANEOUS				
		**********				
	⚠-1-451-229-00	DEFLECTION YOKE				
	1-501-278-00	ANTENNA, TELESCOPIC				
SP901	8-927-139-00	SPEAKER UNIT (030F011)				
V901	⚠-8-735-950-00	CRT (02JM)				

NOTE:

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ACCESSORIES AND PACKING MATERIALS
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Part No.	Description	Remark
⚠-1-463-440-00	ADAPTOR, AC (CANADIAN)	
3-314-021-00	STRAP	
3-314-035-00	CUSHION	
3-314-036-00	SPACER	
3-314-040-00	SLEEVE, ACCESSORY (US,CANADIAN)	
3-314-046-00	CASE, CARRYING, SILVER (US,E)	
3-314-048-00	CASE, CARRYING (CANADIAN)	
3-314-003-00	LABEL, MODEL NUMBER (CANADIAN)	
3-314-049-00	LABEL, MODEL NUMBER (US)	
3-314-052-00	INDIVIDUAL CARTON (US,CANADIAN)	
3-314-058-01	LABEL, NFL TEAM, FOR GIANTS	(US)
3-314-058-11	LABEL, NFL TEAM, FOR JETS	(US)
3-314-058-21	LABEL, NFL TEAM, FOR EAGLES	(US)
3-314-058-31	LABEL, NFL TEAM, FOR COWBOYS	(US)
3-314-058-41	LABEL, NFL TEAM, FOR DOLPHINS	(US)
3-314-058-51	LABEL, NFL TEAM, FOR 49ERS	(US)
3-314-058-61	LABEL, NFL TEAM, FOR BEARS	(US)
3-314-058-71	LABEL, NFL TEAM, FOR RAMS	(US)
3-314-058-81	LABEL, NFL TEAM, FOR RAIDERS	(US)
3-314-058-91	LABEL, NFL TEAM, FOR OILERS	(US)
3-314-068-01	LABEL, NFL TEAM, FOR BROWNS	(US)
3-314-068-11	LABEL, NFL TEAM, FOR LIONS	(US)
3-314-068-21	LABEL, NFL TEAM, FOR PATRIOTS	(US)
3-701-308-00	LABEL, PRODUCT COLOR (CANADIAN)	
3-701-309-00	LABEL, PRODUCT COLOR, FOR SILVER (US,E)	
3-701-314-00	LABEL, PRODUCT COLOR, FOR BLUE (US)	
3-701-622-00	BAG, POLYETHYLENE	
3-703-281-00	LABEL, DOC (A) (CANADIAN)	
3-703-710-00	STICKER, SONY SYMBOL (12)	
3-773-384-21	MANUAL, INSTRUCTION (US)	
3-773-384-31	MANUAL, INSTRUCTION (CANADIAN,E)	
3-881-410-00	BAG, PROTECTION	
4-491-213-21	CARD, INSTRUCTION (US)	

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AC-4A

SERVICE MANUAL

E Model

SPECIFICATIONS

Rated Input Voltage:	110, 120, 220 or 240 V ac adjustable, 50/60 Hz
Power Consumption:	9.2 W ac (50 Hz) 8.9 W ac (60 Hz)
Nominal Output Voltage:	6 V dc
Rated Output Current:	350 mA
Dimensions:	Approx. 65 (w) x 53 (h) x 142 (d) mm $2\frac{5}{8}$ (w) x $2\frac{1}{8}$ (h) x $5\frac{5}{8}$ (d) inches
Weight:	Approx. 460 g, 1lb 1 oz

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

MICROFILM

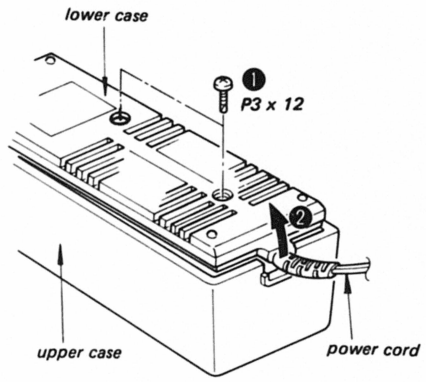
AC POWER ADAPTOR

SONY®

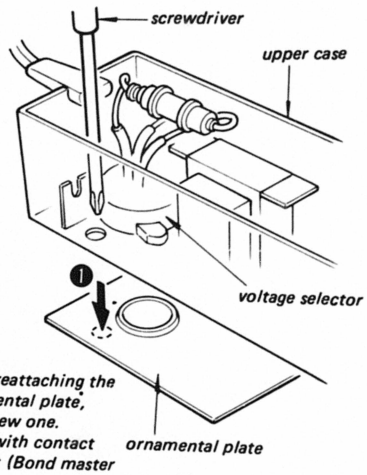
ACC

1. DISASSEMBLY

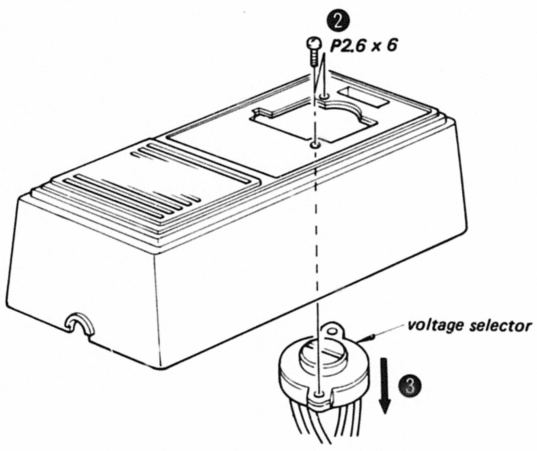
LOWER CASE REMOVAL



VOLTAGE SELECTOR REMOVAL

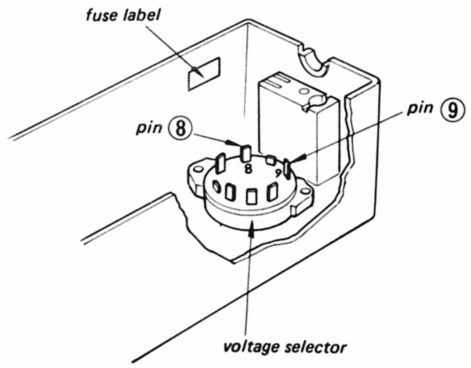


Note:
When reattaching the ornamental plate, use a new one. Fix it with contact cement (Bond master G-580 or equiv.)



CAUTION: Voltage Selector Installation

- *Be sure to install the voltage selector as shown below.*



Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

2. MOUNTING DIAGRAM

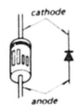
–Conductor Side–

Semiconductor Lead Layouts

2SC1173

10E2
RD7.5E

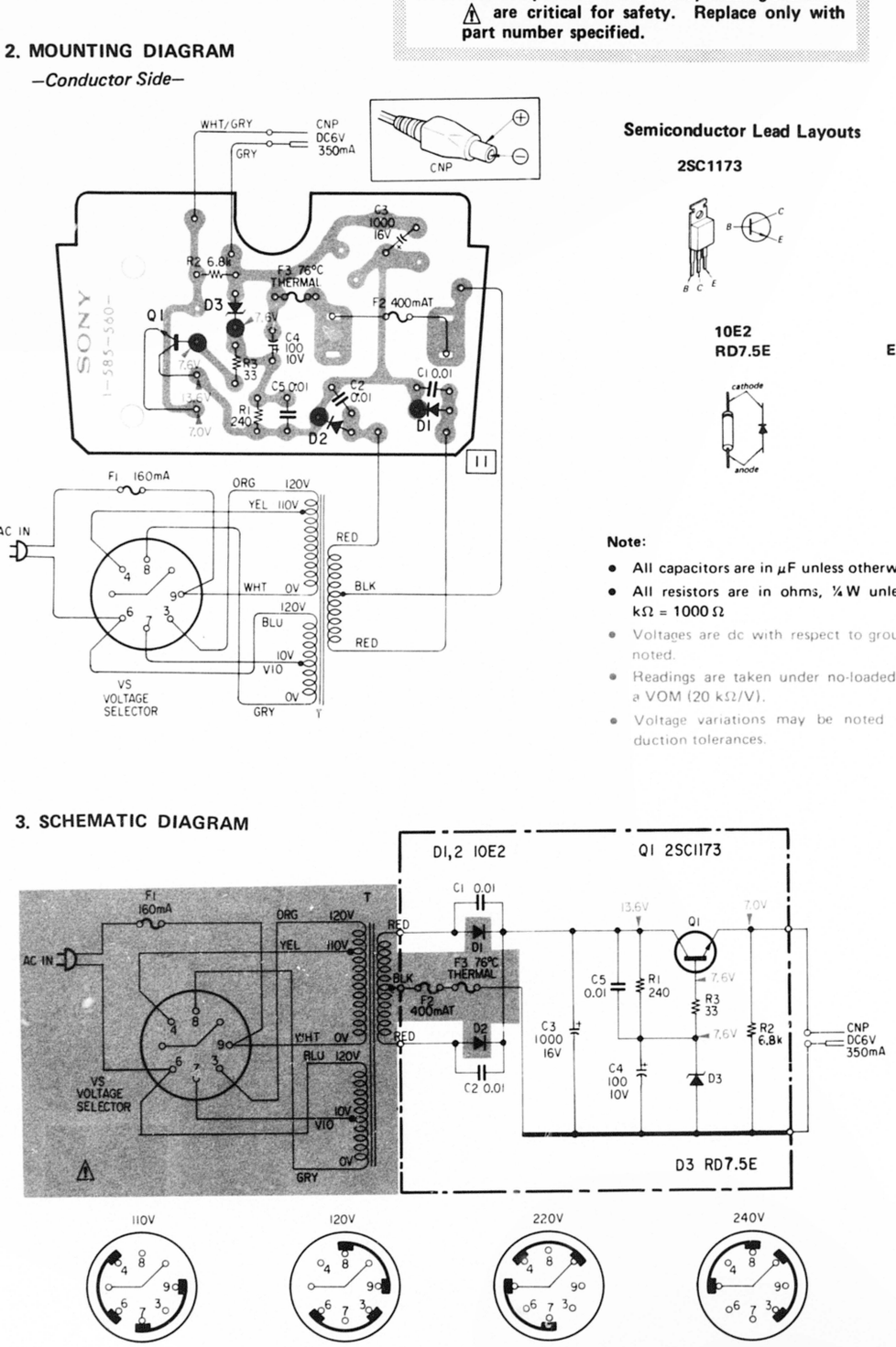
EQB01-08)



Note:

- All capacitors are in μF unless otherwise noted. pF = μμF
- All resistors are in ohms, ¼W unless otherwise noted. kΩ = 1000 Ω
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-loaded conditions with a VOM (20 kΩ/V).
- Voltage variations may be noted due to normal production tolerances.

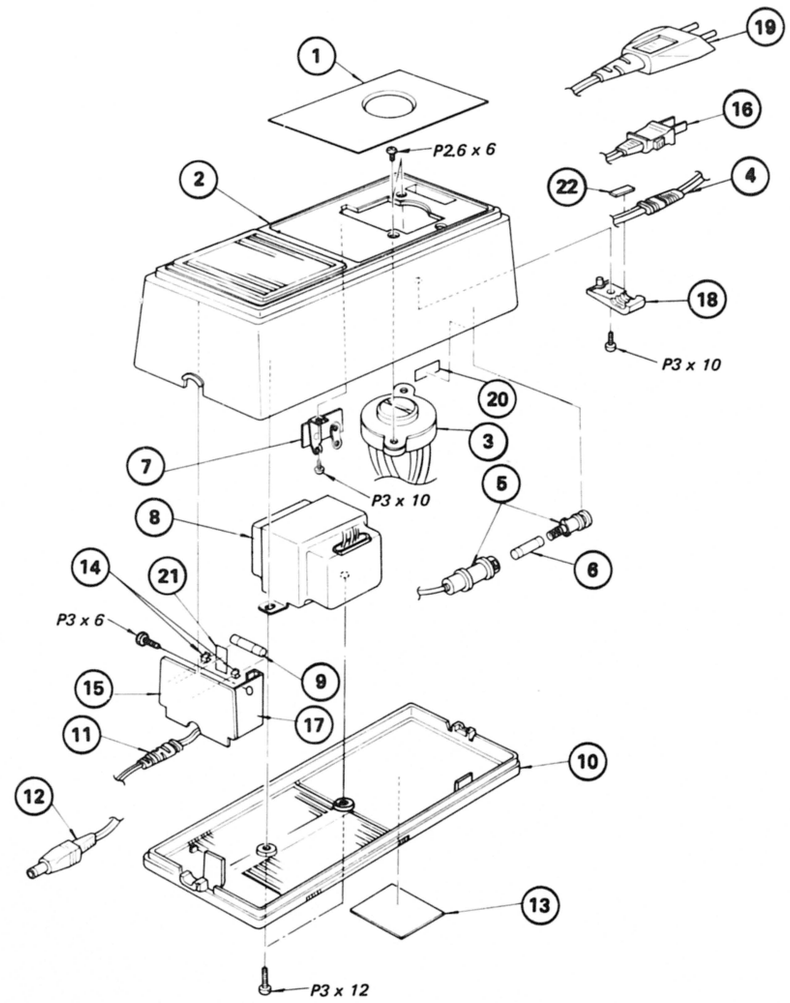
3. SCHEMATIC DIAGRAM



4. EXPLODED VIEW

NOTE:
- Items with no part number and no description are not stocked because they are seldom required for routine service.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked " ♦ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.



No.	Part No.	Description	Remark
1	2-240-103-00	PLATE (E), ORNAMENTAL	
2	2-239-606-00	CABINET, UPPER	
3	⚠1-552-026-00	SWITCH, VOLTAGE CHANGE OVER	
4	⚠2-098-513-00	BUSHING	
5	⚠1-533-102-XX	HOLDER, FUSE (F1)	
6	⚠1-532-079-00	QUICK-ACTING FUSE (F1)	
7	⚠1-536-392-XX	L-TYPE TERMINAL STRIR	
8	⚠1-442-816-00	TRANSFORMER, POWER (T)	
9	⚠1-532-066-00	FUSE, TIME-LAG (F2)	
10	2-239-607-00	CABINET, LOWER	
11	⚠2-098-510-01	BUSHING, CODE	
12	1-534-542-XX	CORD WITH DC PLUG	
13	2-098-516-00	LABEL, MODEL NUMBER, (E)	
14	⚠1-533-037-XX	HOLDER, FUSE (F2)	
15	♦:1-585-560-00	PC BOARD	

No.	Part No.	Description	Remark
16	⚠1-551-188-XX	CORD, POWER (E2 model)	
17	♦:3-538-178-00	HEAT SINC	
18	♦:4-306-550-00	STOPPER, POWER CORD	
19	⚠1-551-427-11	CORD, POWER, EULO PLUG (E1 model)	
20	3-701-986-08	LABEL, FUSE	
21	3-701-948-10	LABEL, FUSE	
22	9-911-841-XX	RUBBER, CHASSIS (E2 model)	
		SCREW	
	7-621-259-45	SCREW +P 2.6X6	
	7-685-145-14	SCREW +P 3X6 TYPE 2 SLIT	
	7-685-147-21	SCREW +P 3X10 TYPE 2 SLIT	
	7-685-148-29	SCREW +P 3X12 TYPE 2 SLIT	

5. ELECTRICAL PARTS LIST

NOTE:

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

• ⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

• Items marked " ♦ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

• All variable and adjustable resistors have characteristic curve B, unless otherwise noted.

CAPACITORS
• MF : μF, PF : μμF

RESISTORS
• All resistors are in ohms
• F : nonflammable

COILS
• MMH : mH, UH : μH

Ref.No.	Part No.	Description			Remark
	♦:1-585-560-00	PC BOARD ********			
	1-553-037-XX	HOLDER, FUSE (F2)			
		CAPACITOR			
C1	1-101-004-00	CERAMIC	0.01MF	50V	
C2	1-101-004-00	CERAMIC	0.01MF	50V	
C3	1-123-488-00	ELECT	1000MF 20%	16V	
C4	1-123-474-00	ELECT	100MF 20%	10V	
C5	1-101-004-00	CERAMIC	0.01MF	50V	
		DIODE			
D1	⚠.8-719-200-02	DIODE 10E2			
D2	⚠.8-719-200-02	DIODE 10E2			
D3	⇒8-719-931-08	DIODE EQB01-08			
		FUSE			
F2	⚠.1-532-066-00	FUSE, TIME-LAG 0.4A			
F3	⚠.1-532-471-00	THERMAL FUSE 76°C			
		TRANSISTOR			
Q1	8-729-217-33	2SC1173			
		RESISTOR			
R1	1-246-458-00	CARBON	240 5%	1/4W	
R2	1-246-493-00	CARBON	6.8K 5%	1/4W	
R3	1-246-437-00	CARBON	33 5%	1/4W	
		MISCELLANEOUS			
CNP	1-534-542-XX	CORD WITH DC PLUG			
F1	⚠.1-532-079-00	QUICK-ACTING FUSE 0.16A			
T	⚠.1-442-816-00	TRANSFORMER, POWER			
VS	⚠.1-552-026-00	SWITCH, VOLTAGE CHANGE OVER			
	⚠.1-533-102-XX	HOLDER, FUSE (F1)			
	⚠.1-551-188-XX	CORD, POWER (E2 model)			
	⚠.1-551-427-11	CORD, POWER, EULO PLUG (E1 model)			
	⚠.1-536-392-XX	L-TYPE TERMINAL STRIP			
		ACCESSORIES AND PACKING MATERIALS **********			
	2-240-101-00	INDIVIDUAL CARTON			
	3-770-109-51	MANUAL, INSTRUCTION			
	3-547-862-00	SHEET (A), PROTECTING			

9-954-495-02

English
83H0458-1
Printed in Japan
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FD-20A

SERVICE MANUAL

US Model

No. 5
November, 1985

SUPPLEMENT

File this supplement with the service manual.

- Schematic and mounting diagrams have been greatly changed into production.

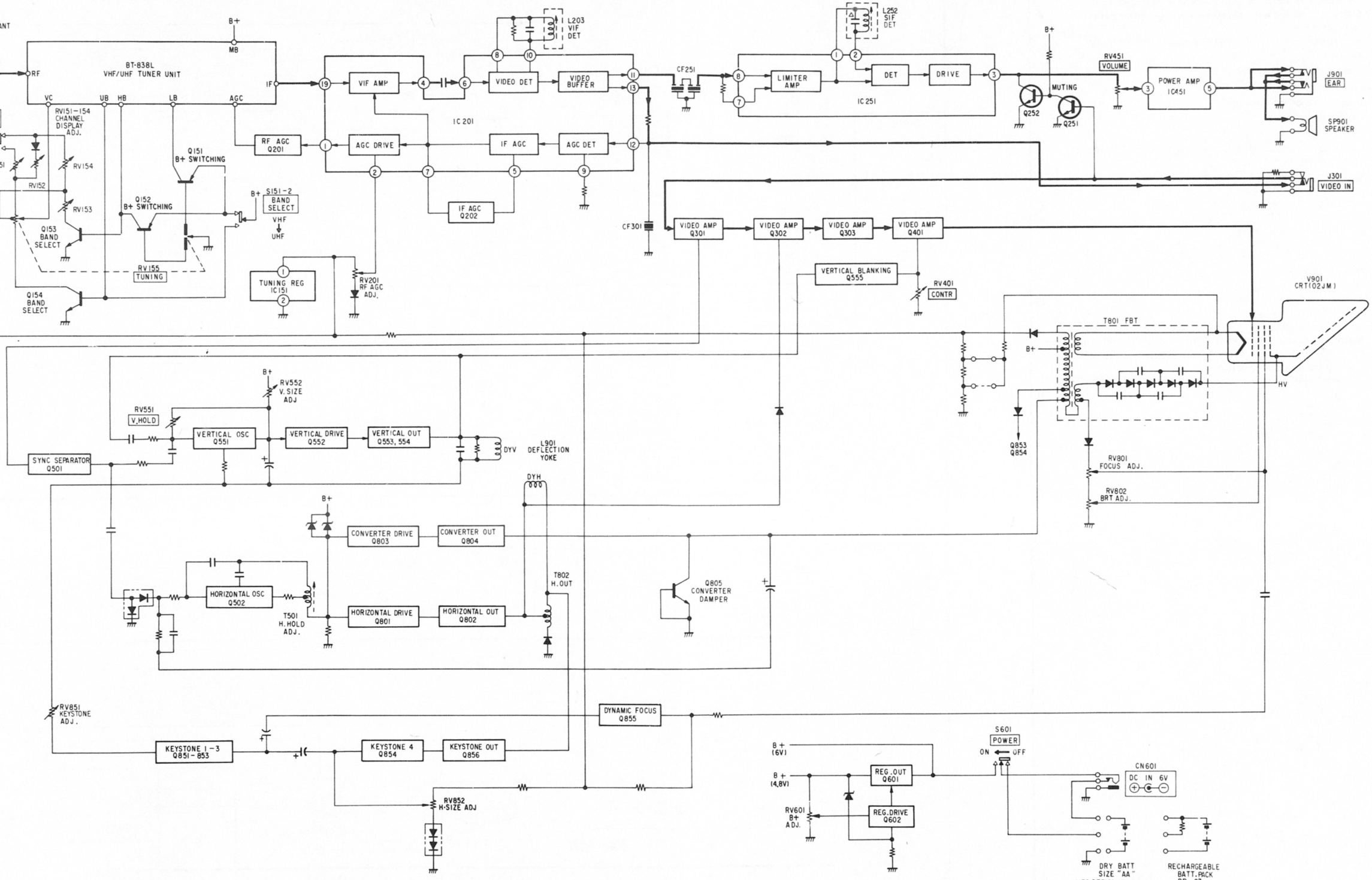
FLAT BLACK AND WHITE TV

SONY®

B&W

FD-20A

1. BLOCK DIAGRAM



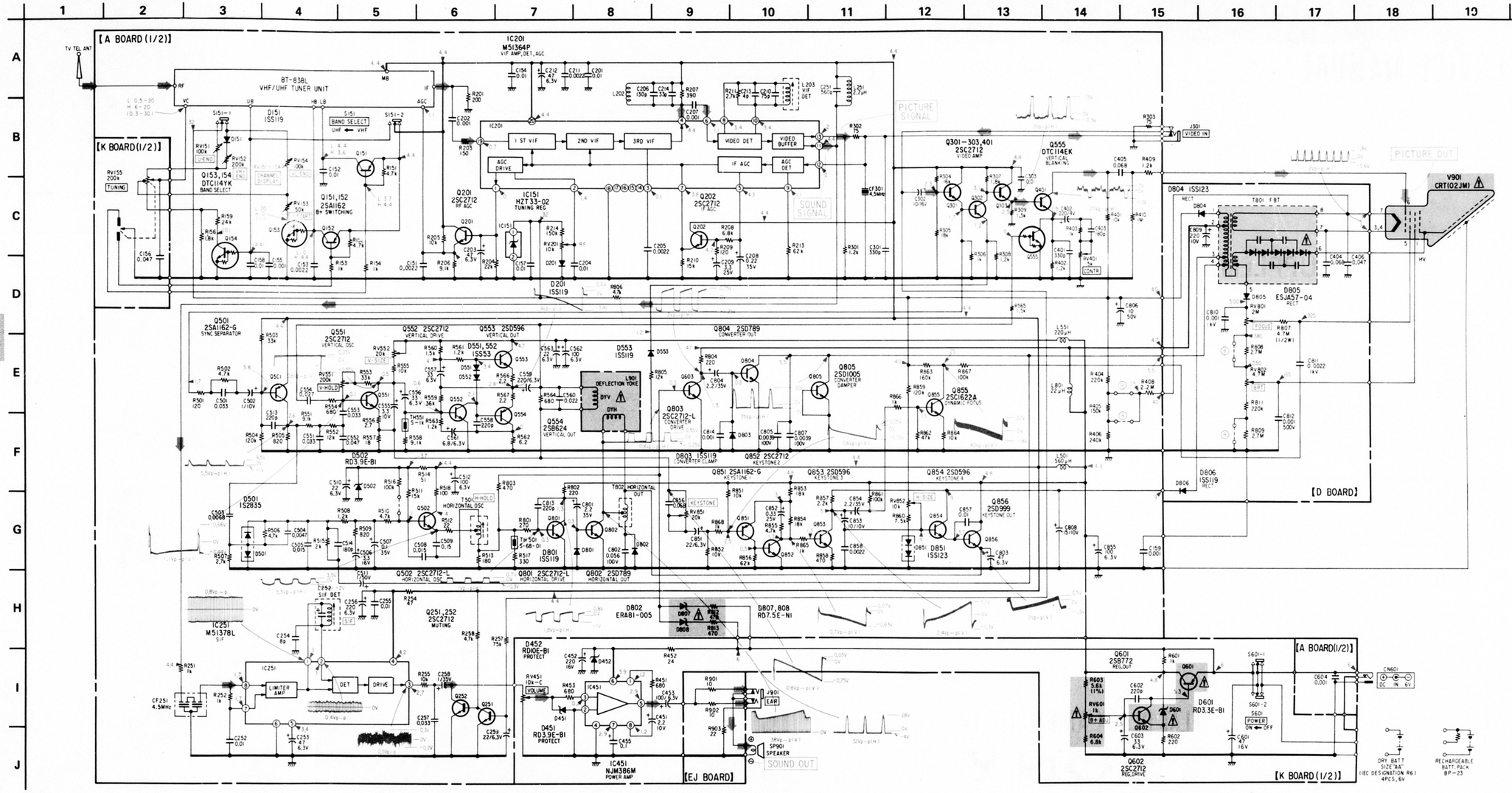
FD-20A FD-20A

2. SCHEMATIC DIAGRAM

Note:

- All capacitors are in μF unless otherwise noted. pF: μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and ¼W or less unless otherwise specified.
- △ : internal component.
- ⇨ : signal path.
- (1%): tolerance identification.
- ▬▬ : B+ bus.
- ▭ : adjustment for repair.
- Power voltage is DC 6 V and fed with regulated DC power supply from battery terminal.
  Voltages are dc with respect to ground in detuned mode with VOM(DC 50 kΩ/V). Voltage variations may be noted due to normal production tolerances.
  no mark : VHF mode
  L : VHF low channel mode
  H : VHF high channel mode
  ( ) : UHF mode
- Waveforms are taken to ground in detuned mode by using oscilloscope.
  Voltage variations may be noted due to normal production tolerances.

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

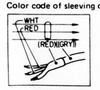


FD-20A FD-20A

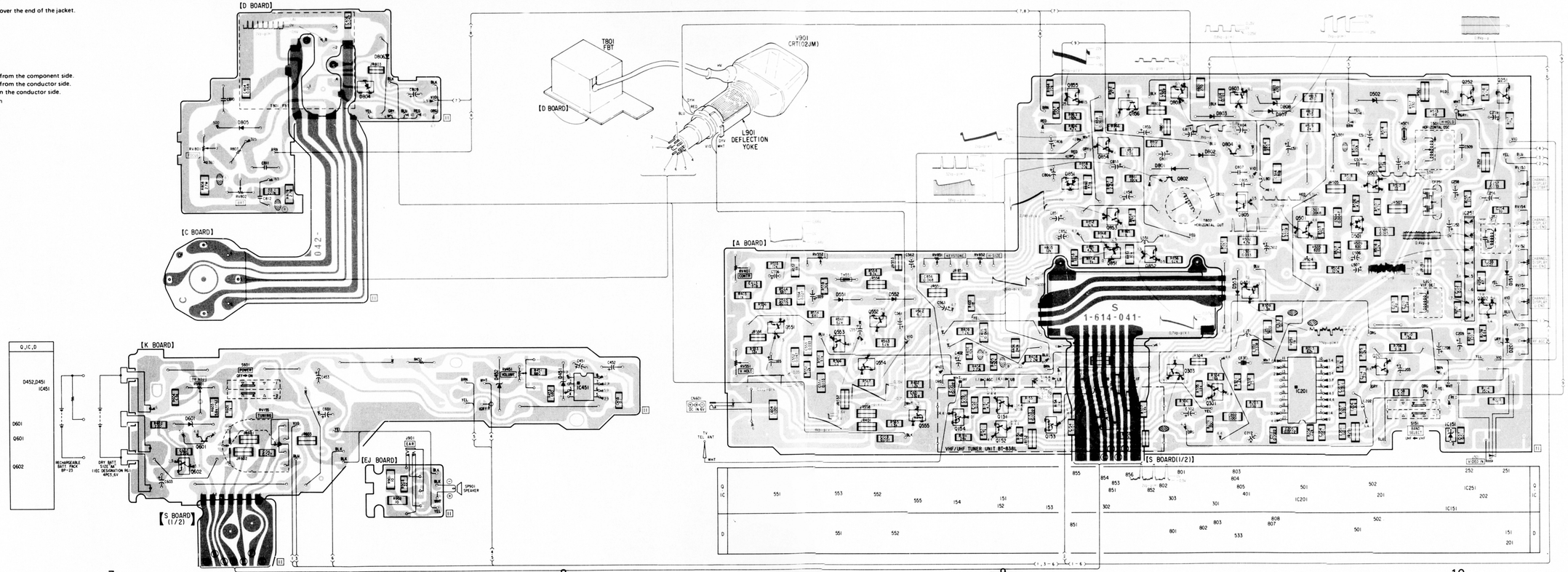
3. MOUNTING DIAGRAM

Note:

- Color code of sleeving over the end of the jacket.

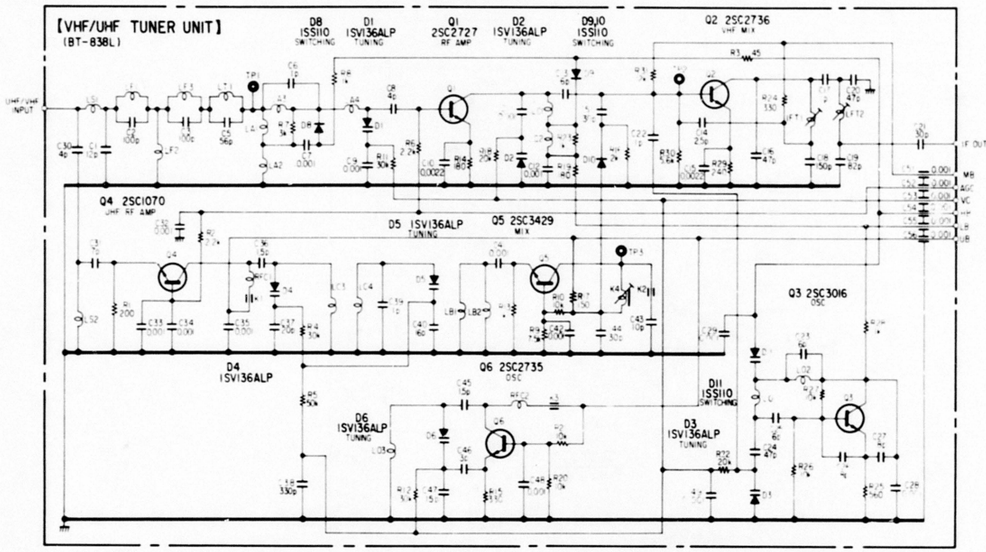


- ——: parts extracted from the component side.
- ←—→: parts extracted from the conductor side.
- ■: part mounted on the conductor side.
- : flexible pattern
- : B+ pattern.



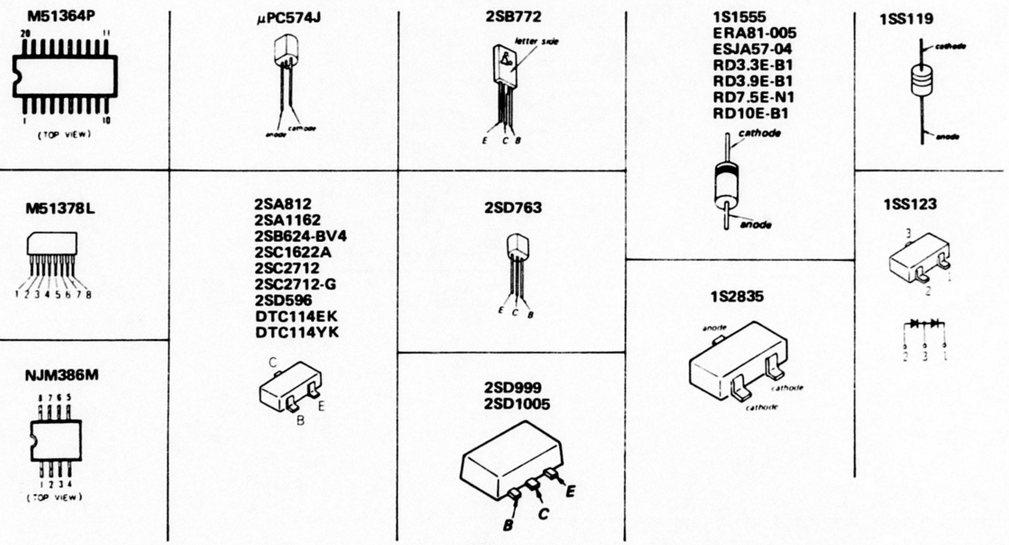
4. VHF/UHF TUNER UNIT (BT-838L) SCHEMATIC DIAGRAM

The VHF/UHF tuner unit is carefully adjusted at the factory and is supplied as one whole block for replacement.



Note: Tuner reference numbers are not included in the Electrical Parts List.

• Semiconductor Lead Layouts



5. EXPLODED VIEWS AND PARTS LIST

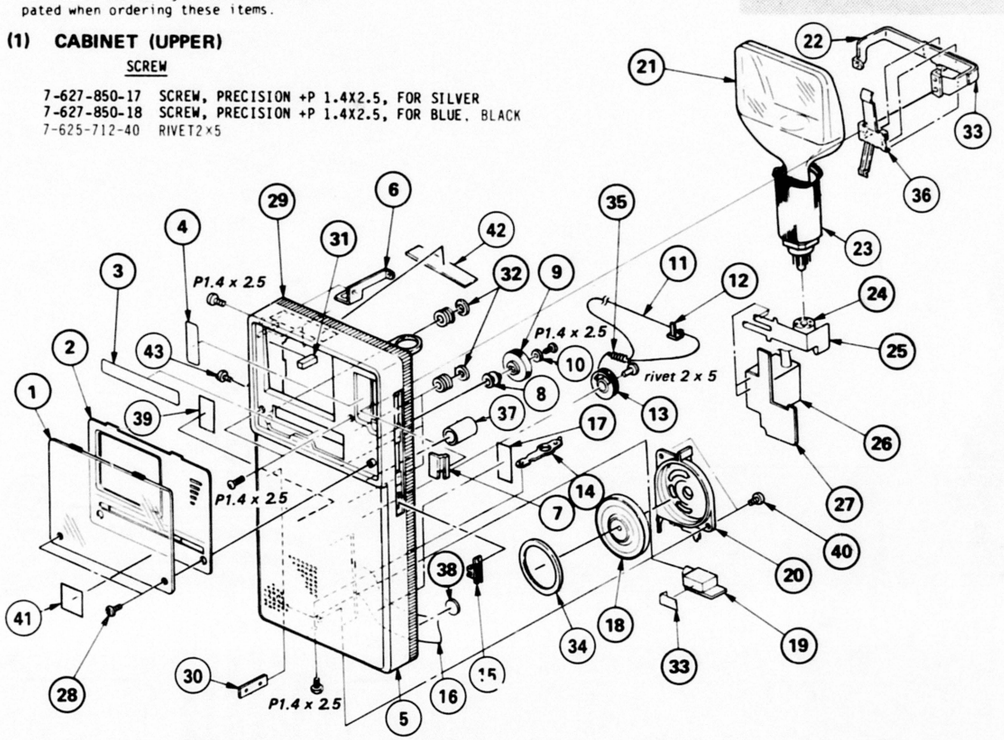
NOTE:
- The mechanical parts with no reference number in the exploded views are not supplied.
- Items marked " ★ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The construction parts of an assembled part are indicated with a collation number in the remark column.

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

(1) CABINET (UPPER)

SCREW

7-627-850-17 SCREW, PRECISION +P 1.4X2.5, FOR SILVER
7-627-850-18 SCREW, PRECISION +P 1.4X2.5, FOR BLUE, BLACK
7-625-712-40 RIVET2×5



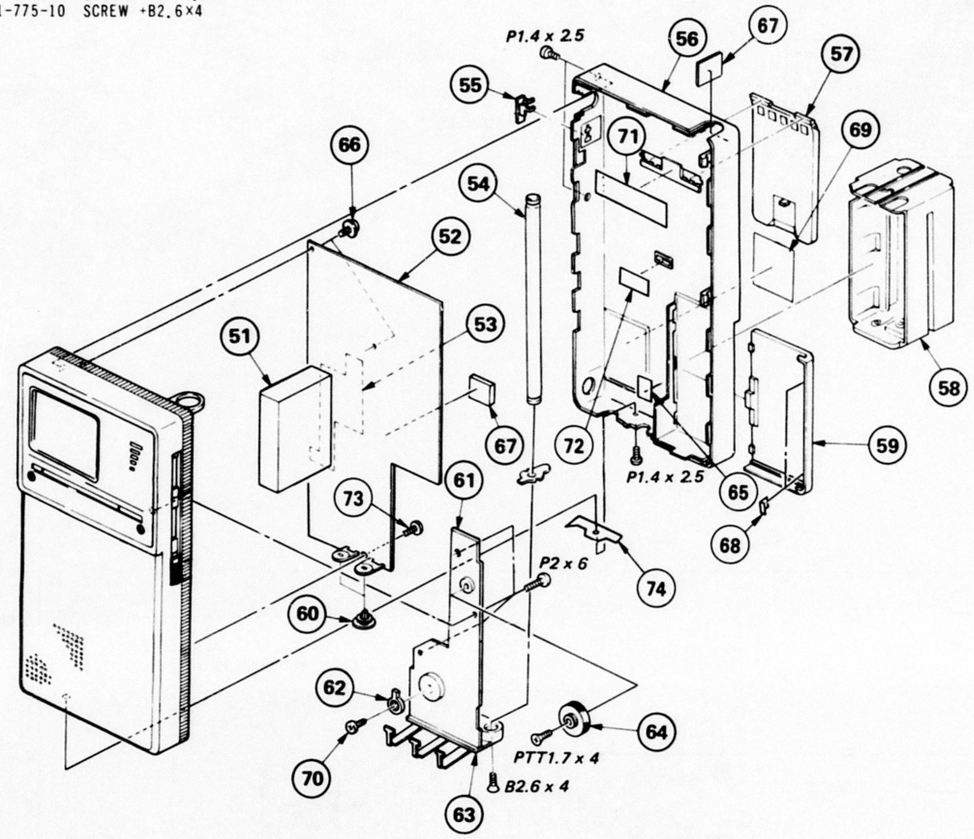
No.	Part No.	Description	Remarks
1	3-314-015-11	FILTER	
2	3-314-028-41	FRAME	
3	3-314-018-00	SHEET (A), ORNAMENTAL	
4	3-314-019-00	SHEET (B), ORNAMENTAL	
5	X-3314-014-1	(BLUE).....CABINET (UPPER) ASSY	
	X-3314-015-1	(SILVER)...CABINET (UPPER) ASSY	
	X-3314-040-1	(BLACK)....CABINET (UPPER) ASSY	
6	3-314-010-00	BRACKET, STRAP	
7	*3-314-011-00	INDICATOR, VOLUME	
8	3-314-012-00	SHAFT, DIAL	
9	3-314-013-00	(SILVER).....KNOB, TUNING	
	3-314-013-11	(BLUE,BLACK)...KNOB, TUNING	
10	3-569-403-00	RETAINER, LEVER	
11	9-911-825-32	STRING DIAL 0.3DIA	
12	3-314-008-00	POINTER	
13	3-314-007-00	DRUM, DIAL	
14	3-314-016-00	PLATE (A), NUT	
15	3-314-027-00	(SILVER).....KNOB (A), SLIDE	
	3-314-027-11	(BLUE,BLACK)...KNOB (A), SLIDE	
16	9-911-816-02	CLOTH, DRAWER, BATTERY	
17	3-314-050-00	LABEL, CAUTION, POWER	
18	1-503-398-11	SPEAKER (ROUND TYPE) (3CM)	
19	*1-614-046-11	PC BOARD, EJ	

No.	Part No.	Description	Remarks
20	3-319-110-01	HOLDER, SPEAKER	
21	⚠ .8-735-951-21	CRT 02JM(PS)	
22	*3-314-025-03	HOLDER, B TUBE	
23	⚠ .1-451-229-00	DEFLECTION YOKE	
24	1-526-736-00	SOCKET, CRT	
25	1-614-042-11	PC BOARD, C	
26	⚠ .1-439-352-11	TRANSFORMER ASSY, FLYBACK	
27	*1-614-045-11	PC BOARD, D	
28	3-314-055-00	SCREW (M1.4), PIN-FACE	
29	3-314-002-00	STRIP, ORNAMENTAL	
30	*3-314-017-02	PLATE (B), NUT	
31	9-911-844-XX	RUBBER, BRAKE (t=2)	
32	3-489-108-00	WASHER, NYLON	
33	*3-319-125-01	SHEET, INSULATING	
34	3-314-005-11	CUSHION, SPEAKER	
35	4-875-562-00	SPRING, TENSION	
36	3-323-307-01	SPRING	
37	*3-576-954-00	RETAINER, SOLENOID	
38	3-527-126-00	MARK, BATTERY CASE	
39	3-314-062-00	LABEL, CAUTION, SERVICE	
40	3-309-597-31	SCREW (M1.4), TAPPING,PRECISION	
41	3-703-710-01	STICKER, SONY SYMBOL (12)	
42	9-911-863-XX	SPACER, HOLDER, LAMP (t=0.5)	
43	3-703-816-02	SCREW (M1.4X2.0), SPECIAL HEAD	

(2) CABINET (LOWER)

SCREW

7-685-104-11 SCREW +P 2X6 TYPE2 NON-SLIT
7-627-850-17 SCREW, PRECISION +P 1.4X2.5, FOR SILVER
7-627-850-18 SCREW, PRECISION +P 1.4X2.5, FOR BLUE, BLACK
7-685-773-04 SCREW +PTT 1.7×4
7-621-775-10 SCREW +B2.6×4



No.	Part No.	Description	Remarks
51	1-463-538-11	TUNER UNIT (UHF/VHF)(BT-838L)	
52	*A-3015-352-A	PC BOARD ASSY, A	
53	1-614-041-11	PC BOARD, S	
54	1-501-278-00	ANTENNA, TELESCOPIC	
55	3-314-039-00	(SILVER).....KNOB (B), SLIDE	
	3-314-039-11	(BLUE,BLACK)....KNOB (B), SLIDE	
56	3-314-033-21	(BLUE).....CABINET (LOWER)	
	3-314-033-31	(SILVER)...CABINET (LOWER)	
	3-314-033-81	(BLACK)....CABINET (LOWER)	
57	3-314-029-03	(SILVER)...STAND	
	3-314-029-13	(BLACK)....STAND	
	3-314-029-21	(BLUE).....STAND	
58	X-3314-011-0	HOLDER ASSY, BATTERY	
59	3-314-023-21	(BLUE).....LID, BATTERY CASE	
	3-314-023-31	(SILVER)...LID, BATTERY CASE	
	3-314-023-71	(BLACK)....LID, BATTERY CASE	
60	3-314-022-00	(SILVER).....KNOB, ADJUSTMENT	
	3-314-022-11	(BLUE,BLACK)...KNOB, ADJUSTMENT	

No.	Part No.	Description	Remarks
61	*A-3015-353-A	PC BOARD ASSY, K	
62	3-319-103-01	JOINT, TUNING	
63	X-3314-012-1	(BLUE)....PIECE SUB ASSY, BATTERY CONTACT	
	X-3314-013-1	(SILVER)..PIECE SUB ASSY, BATTERY CONTACT	
	X-3314-039-1	(BLACK)...PIECE SUB ASSY, BATTERY CONTACT	
64	3-314-026-00	(SILVER).....KNOB, CONTROL	
	3-314-026-11	(BLUE,BLACK)...KNOB, CONTROL	
65	3-831-441-11	CUSHION (B)(t=0.5)	
66	3-703-502-21	SCREW	
67	9-911-839-XX	RUBBER (A)(t=1)	
68	3-831-441-XX	SPACER (t=0.5)	
69	3-314-049-00	LABEL, MODEL NUMBER (U)	
70	3-880-990-00	SCREW (1.7X3), FLAT, (+) SPECIAL	
71	*3-314-065-00	SHEET (A), PROTECTION	
72	3-314-066-00	SHEET (B), PROTECTION	
73	3-318-202-01	SCREW (M1.4X3), TAPPING	
74	3-323-319-01	CONDUCTOR, ELECTROSTATIC	

6. ELECTRICAL PARTS LIST

NOTE:
- Items marked " ★ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- If there are two or more same circuitsin a set such as a stereophonic machine, only typical circuit parts may be indicated and capacitors and resistors in other same circuits may be omitted.

CAPACITORS:
MF:μF, PF:μμF.

RESISTORS
· All resistors are in ohms.
· F : nonflammable

COILS
· MMH : mH, UH : μH

SEMICONDUCTORS
In each case, U : μ, for example:
UA...: μA..., UPA...: μPA..., UPC...: μPC, UPD...: μPD...

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

ELECTRICAL PARTS

Ref.No.	Part No.	Description		
	1-463-538-11	TUNER UNIT (UHF/VHF)(BT-838L)		
	1-501-278-00	ANTENNA, TELESCOPIC		
	1-526-736-00	SOCKET, CRT		
	1-614-041-11	PC BOARD, S		
	1-614-042-11	PC BOARD, C		
	*1-614-045-11	PC BOARD, D		
	*1-614-046-11	PC BOARD, EJ		
	*A-3015-352-A	PC BOARD ASSY, A		
	*A-3015-353-A	PC BOARD ASSY, K		
C151	1-163-027-00	CERAMIC CHIP 0.0022MF		50V
C152	1-163-021-00	CERAMIC CHIP 0.01MF		50V
C153	1-163-027-00	CERAMIC CHIP 0.0022MF		50V
C154	1-163-021-00	CERAMIC CHIP 0.01MF		50V
C155	1-163-141-00	CERAMIC CHIP 0.001MF	5%	50V
C156	1-163-035-00	CERAMIC CHIP 0.047MF		50V
C157	1-163-021-00	CERAMIC CHIP 0.01MF		50V
C158	1-163-021-00	CERAMIC CHIP 0.01MF		50V
C159	1-163-141-00	CERAMIC CHIP 0.001MF	5%	50V
C201	1-163-021-00	CERAMIC CHIP 0.01MF		50V
C202	1-163-205-00	CERAMIC CHIP 0.001MF	5%	50V
C203	1-124-224-00	ELECT 47MF	20%	6.3V
C204	1-163-021-00	CERAMIC CHIP 0.01MF		50V
C205	1-163-027-00	CERAMIC CHIP 0.0022MF		50V
C206	1-163-120-00	CERAMIC CHIP 130PF	5%	50V
C207	1-163-141-00	CERAMIC CHIP 0.001MF	5%	50V
C208	1-131-343-00	TANTALUM 0.22MF	20%	35V
C209	1-124-258-00	ELECT 3.3MF	20%	50V
C210	1-163-114-00	CERAMIC CHIP 75PF	5%	50V
C211	1-163-027-00	CERAMIC CHIP 0.0022MF		50V
C212	1-131-387-00	TANTALUM 47MF	20%	6.3V
C213	1-163-087-00	CERAMIC CHIP 4PF	0.25PF	50V
C214	1-163-105-00	CERAMIC CHIP 33PF	5%	50V
C251	1-163-199-00	CERAMIC CHIP 560PF	5%	50V
C252	1-163-021-00	CERAMIC CHIP 0.01MF		50V
C253	1-124-224-00	ELECT 47MF	20%	6.3V
C254	1-163-091-00	CERAMIC CHIP 8PF	0.25PF	50V
C255	1-163-021-00	CERAMIC CHIP 0.01MF		50V
C256	1-124-140-00	ELECT 220MF	20%	10V
C257	1-163-074-00	CERAMIC CHIP 0.033MF	10%	25V
C258	1-131-347-00	TANTALUM 1MF	20%	35V
C259	1-124-222-00	ELECT 22MF	20%	6.3V
C301	1-163-129-00	CERAMIC CHIP 330PF	5%	50V
C302	1-123-617-00	ELECT 10MF	20%	16V
C303	1-163-021-00	CERAMIC CHIP 0.01MF		50V
C401	1-163-129-00	CERAMIC CHIP 330PF	5%	50V

ELECTRICAL PARTS

Ref.No.	Part No.	Description		
C402	1-124-413-00	ELECT 220MF	20%	4V
C403	1-163-257-00	CERAMIC CHIP 180PF	5%	50V
C404	1-163-076-00	CERAMIC CHIP 0.068MF		50V
C405	1-163-076-00	CERAMIC CHIP 0.068MF		50V
C406	1-163-035-00	CERAMIC CHIP 0.047MF		50V
C451	1-131-419-00	TANTALUM 2.2MF	20%	10V
C452	1-124-144-00	ELECT 220MF	20%	16V
C453	1-124-225-00	ELECT 100MF	20%	6.3V
C455	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C501	1-163-074-00	CERAMIC CHIP 0.033MF	10%	25V
C502	1-131-418-00	TANTALUM 1MF	20%	10V
C503	1-163-057-00	CERAMIC CHIP 0.0068MF	10%	50V
C504	1-163-055-00	CERAMIC CHIP 0.0047MF	10%	50V
C505	1-163-061-00	CERAMIC CHIP 0.015MF	10%	50V
C506	1-131-417-00	TANTALUM 3.3MF	20%	16V
C507	1-131-402-00	TANTALUM 0.1MF	20%	35V
C508	1-108-583-00	MYLAR 0.015MF	5%	50V
C509	1-130-497-00	MYLAR 0.15MF	5%	50V
C510	1-124-222-00	ELECT 22MF	20%	6.3V
C511	1-124-255-00	ELECT 1MF	20%	50V
C512	1-124-225-00	ELECT 100MF	20%	6.3V
C513	1-163-125-00	CERAMIC CHIP 220PF	5%	50V
C514	1-163-187-00	CERAMIC CHIP 180PF	5%	50V
C551	1-163-074-00	CERAMIC CHIP 0.033MF	10%	25V
C552	1-163-075-00	CERAMIC CHIP 0.047MF	10%	25V
C553	1-163-074-00	CERAMIC CHIP 0.033MF	10%	25V
C554	1-163-064-00	CERAMIC CHIP 0.027MF	10%	50V
C555	1-131-368-00	TANTALUM 3.3MF	20%	16V
C556	1-124-229-00	ELECT 33MF	20%	10V
C557	1-131-386-00	TANTALUM 33MF	20%	6.3V
C558	1-163-125-00	CERAMIC CHIP 220PF	5%	50V
C559	1-124-140-00	ELECT 220MF	20%	10V
C560	1-163-037-00	CERAMIC CHIP 0.022MF	10%	10V
C561	1-131-423-00	TANTALUM 6.8MF	20%	6.3V
C562	1-124-225-00	ELECT 100MF	20%	6.3V
C563	1-131-385-00	TANTALUM 22MF	20%	6.3V
C601	1-124-236-00	ELECT 47MF	20%	16V
C602	1-163-125-00	CERAMIC CHIP 220PF	5%	50V
C603	1-124-229-00	ELECT 33MF	20%	10V
C604	1-163-205-00	CERAMIC CHIP 0.001MF	5%	50V
C801	1-131-349-00	TANTALUM 2.2MF	20%	35V
C802	1-106-214-00	MYLAR 0.056MF	5%	100V
C803	1-131-387-00	TANTALUM 47MF	20%	6.3V
C804	1-131-349-00	TANTALUM 2.2MF	20%	35V
C805	1-106-186-00	MYLAR 0.0039MF	5%	100V

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
C806	1-124-261-00	ELECT	10MF	20%	50V
C807	1-106-186-00	MYLAR	0.0039MF	5%	100V
C808	1-131-378-00	TANTALUM	15MF	20%	10V
C809	1-124-361-00	ELECT	220MF	20%	10V
C810	1-162-146-00	CERAMIC	0.001MF		1KV
C811	1-162-147-00	CERAMIC	0.0022MF		1KV
C812	1-102-038-00	CERAMIC	0.001MF	99%	500V
C813	1-163-125-00	CERAMIC CHIP	220PF	5%	50V
C814	1-163-141-00	CERAMIC CHIP	0.001MF	5%	50V
C851	1-124-222-00	ELECT	22MF	20%	6.3V
C852	1-131-409-00	TANTALUM	0.33MF	20%	25V
C853	1-124-233-00	ELECT	10MF	20%	16V
C854	1-131-349-00	TANTALUM	2.2MF	20%	35V
C855	1-124-225-00	ELECT	100MF	20%	6.3V
C856	1-163-076-00	CERAMIC CHIP	0.068MF		50V
C857	1-163-059-00	CERAMIC CHIP	0.01MF	10%	50V
C858	1-163-213-00	CERAMIC CHIP	0.0022MF	10%	50V
CF251	1-527-943-00	FILTER, CERAMIC			
CF301	1-409-370-00	TRAP, CERAMIC 4.5MHZ			
CN601	1-507-563-00	DC JACK (DC IN 6V)			
D151	8-719-911-19	DIODE 1SS119			
D201	8-719-911-19	DIODE 1SS119			
D451	8-719-100-20	DIODE RD3.9E-B1			
D452	8-719-100-56	DIODE RD10E-B1			
D501	8-719-100-03	DIODE 1S2835			
D502	8-719-100-20	DIODE RD3.9E-B1			
D551	8-719-815-55	DIODE 1S1555			
D552	8-719-815-55	DIODE 1S1555			
D553	8-719-911-19	DIODE 1SS119			
D601 ⚠	**.8-719-100-16**	**DIODE RD3.3E-B1**			
D801	8-719-911-19	DIODE 1SS119			
D802	8-719-908-06	DIODE ERA81-005			
D803	8-719-911-19	DIODE 1SS119			
D804	8-719-101-23	DIODE 1SS123			
D805	8-719-903-28	DIODE ESJA57-04			
D806	8-719-911-19	DIODE 1SS119			
D807 ⚠	**.8-719-102-80**	**DIODE RD7.5E-N1**			
D808 ⚠	**.8-719-102-80**	**DIODE RD7.5E-N1**			
D851	8-719-101-23	DIODE 1SS123			
IC151	8-759-157-40	IC UPC574J			
IC201	8-759-600-13	IC M51364P			
IC251	8-759-600-46	IC M51378L			
IC451	8-759-700-50	IC NJM386M			
J301	1-507-862-00	JACK, VIDEO IN			
J901	1-507-838-00	JACK (EAR)			
JR151	1-216-296-00	METAL CHIP	0	5%	1/8W
JR152	1-216-296-00	METAL CHIP	0	5%	1/8W
JR153	1-216-295-00	METAL CHIP	0	5%	1/10W
JR154	1-216-295-00	METAL CHIP	0	5%	1/10W
JR201	1-216-296-00	METAL CHIP	0	5%	1/8W
JR251	1-216-295-00	METAL CHIP	0	5%	1/10W
JR252	1-216-296-00	METAL CHIP	0	5%	1/8W
JR302	1-216-296-00	METAL CHIP	0	5%	1/8W
JR303	1-216-296-00	METAL CHIP	0	5%	1/8W
JR304	1-216-295-00	METAL CHIP	0	5%	1/10W
JR401	1-216-296-00	METAL CHIP	0	5%	1/8W
JR501	1-216-296-00	METAL CHIP	0	5%	1/8W

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
JR503	1-216-296-00	METAL CHIP	0	5%	1/8W
JR504	1-216-295-00	METAL CHIP	0	5%	1/10W
JR505	1-216-296-00	METAL CHIP	0	5%	1/8W
JR551	1-216-296-00	METAL CHIP	0	5%	1/8W
JR553	1-216-295-00	METAL CHIP	0	5%	1/10W
JR554	1-216-296-00	METAL CHIP	0	5%	1/8W
JR556	1-216-295-00	METAL CHIP	0	5%	1/10W
JR557	1-216-296-00	METAL CHIP	0	5%	1/8W
JR558	1-216-296-00	METAL CHIP	0	5%	1/8W
JR601	1-216-296-00	METAL CHIP	0	5%	1/8W
JR602	1-216-296-00	METAL CHIP	0	5%	1/8W
JR603	1-216-296-00	METAL CHIP	0	5%	1/8W
JR801	1-216-295-00	METAL CHIP	0	5%	1/10W
JR802	1-216-296-00	METAL CHIP	0	5%	1/8W
JR803	1-216-295-00	METAL CHIP	0	5%	1/10W
JR851	1-216-295-00	METAL CHIP	0	5%	1/10W
L202	*1-422-109-00	COIL, AIR-CORE			
L203	1-404-446-00	COIL, VIF DETECTOR			
L251	1-408-555-00	MICRO INDUCTOR 2.2UH			
L252	1-404-387-00	COIL, FM DETECTOR			
L501	1-408-098-00	MICRO INDUCTOR 560UH			
L551	1-408-088-00	MICRO INDUCTOR 220UH			
L801	1-408-121-00	MICRO INDUCTOR 22UH			
L901 ⚠	**.1-451-229-00**	**DEFLECTION YOKE**			
Q151	8-729-216-22	TRANSISTOR 2SA1162			
Q152	8-729-216-22	TRANSISTOR 2SA1162			
Q153	8-729-900-52	TRANSISTOR DTC114YK			
Q154	8-729-900-52	TRANSISTOR DTC114YK			
Q201	8-729-271-22	TRANSISTOR 2SC2712-G			
Q202	8-729-271-22	TRANSISTOR 2SC2712-G			
Q251	8-729-271-22	TRANSISTOR 2SC2712-G			
Q252	8-729-271-22	TRANSISTOR 2SC2712-G			
Q301	8-729-271-22	TRANSISTOR 2SC2712-G			
Q302	8-729-271-22	TRANSISTOR 2SC2712-G			
Q303	8-729-271-22	TRANSISTOR 2SC2712-G			
Q401	8-729-271-22	TRANSISTOR 2SC2712-G			
Q501	8-729-100-76	TRANSISTOR 2SA812			
Q502	8-729-271-23	TRANSISTOR 2SC2712			
Q551	8-729-271-22	TRANSISTOR 2SC2712-G			
Q552	8-729-271-22	TRANSISTOR 2SC2712-G			
Q553	8-729-159-64	TRANSISTOR 2SD596			
Q554	8-729-162-44	TRANSISTOR 2SB624-BV4			
Q555	8-729-900-53	TRANSISTOR DTC114EK			
Q601 ⚠	**.8-729-177-23**	**TRANSISTOR 2SB772**			
Q602 ⚠	**.8-729-271-22**	**TRANSISTOR 2SC2712-G**			
Q801	8-729-271-23	TRANSISTOR 2SC2712			
Q802	8-729-300-31	TRANSISTOR 2SD763			
Q803	8-729-271-23	TRANSISTOR 2SC2712			
Q804	8-729-300-31	TRANSISTOR 2SD763			
Q805	8-729-103-72	TRANSISTOR 2SD1005			
Q851	8-729-100-76	TRANSISTOR 2SA812			
Q852	8-729-271-22	TRANSISTOR 2SC2712-G			
Q853	8-729-159-64	TRANSISTOR 2SD596			
Q854	8-729-159-64	TRANSISTOR 2SD596			
Q855	8-729-103-16	TRANSISTOR 2SC1622A			
Q856	8-729-199-92	TRANSISTOR 2SD999			

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
R151	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R152	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R153	1-216-049-00	METAL CHIP	1K	5%	1/10W
R154	1-216-198-00	METAL CHIP	1K	5%	1/8W
R156	1-216-055-00	METAL CHIP	1.8K	5%	1/10W
R159	1-216-082-00	METAL CHIP	24K	5%	1/10W
R201	1-216-032-00	METAL CHIP	200	5%	1/10W
R203	1-216-029-00	METAL CHIP	150	5%	1/10W
R204	1-216-081-00	METAL CHIP	22K	5%	1/10W
R205	1-216-073-00	METAL CHIP	10K	5%	1/10W
R206	1-216-072-00	METAL CHIP	9.1K	5%	1/10W
R207	1-216-039-00	METAL CHIP	390	5%	1/10W
R208	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R209	1-216-027-00	METAL CHIP	120	5%	1/10W
R210	1-216-077-00	METAL CHIP	15K	5%	1/10W
R211	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R213	1-216-092-00	METAL CHIP	62K	5%	1/10W
R214	1-216-101-00	METAL CHIP	150K	5%	1/10W
R251	1-216-198-00	METAL CHIP	1K	5%	1/8W
R252	1-216-049-00	METAL CHIP	1K	5%	1/10W
R254	1-216-166-00	METAL CHIP	47	5%	1/8W
R255	1-216-073-00	METAL CHIP	10K	5%	1/10W
R257	1-216-094-00	METAL CHIP	75K	5%	1/10W
R258	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R301	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R302	1-216-022-00	METAL CHIP	75	5%	1/10W
R303	1-216-022-00	METAL CHIP	75	5%	1/10W
R304	1-216-078-00	METAL CHIP	16K	5%	1/10W
R305	1-216-079-00	METAL CHIP	18K	5%	1/10W
R306	1-216-049-00	METAL CHIP	1K	5%	1/10W
R307	1-216-055-00	METAL CHIP	1.8K	5%	1/10W
R308	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R309	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R401	1-216-073-00	METAL CHIP	10K	5%	1/10W
R402	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R403	1-216-049-00	METAL CHIP	1K	5%	1/10W
R404	1-216-105-00	METAL CHIP	220K	5%	1/10W
R405	1-216-101-00	METAL CHIP	150K	5%	1/10W
R406	1-216-255-00	METAL CHIP	240K	5%	1/8W
R408	1-216-129-00	METAL CHIP	2.2M	5%	1/10W
R409	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R410	1-216-121-00	METAL CHIP	1M	5%	1/10W
R451	1-216-045-00	METAL CHIP	680	5%	1/10W
R452	1-247-792-00	CARBON	24	5%	1/6W
R453	1-216-045-00	METAL CHIP	680	5%	1/10W
R501	1-216-027-00	METAL CHIP	120	5%	1/10W
R502	1-216-214-00	METAL CHIP	4.7K	5%	1/8W
R503	1-216-085-00	METAL CHIP	33K	5%	1/10W
R504	1-216-099-00	METAL CHIP	120K	5%	1/10W
R505	1-216-196-00	METAL CHIP	820	5%	1/8W
R506	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R507	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R508	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R509	1-216-196-00	METAL CHIP	820	5%	1/8W
R510	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R511	1-216-077-00	METAL CHIP	15K	5%	1/10W
R512	1-216-009-00	METAL CHIP	22	5%	1/10W

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
R513	1-216-180-00	METAL CHIP	180	5%	1/8W
R514	1-216-018-00	METAL CHIP	51	5%	1/10W
R515	1-216-205-00	METAL CHIP	2K	5%	1/8W
R516	1-216-097-00	METAL CHIP	100K	5%	1/10W
R517	1-216-186-00	METAL CHIP	330	5%	1/8W
R518	1-216-025-00	METAL CHIP	100	5%	1/10W
R551	1-216-072-00	METAL CHIP	9.1K	5%	1/10W
R552	1-216-075-00	METAL CHIP	12K	5%	1/10W
R553	1-216-085-00	METAL CHIP	33K	5%	1/10W
R554	1-216-045-00	METAL CHIP	680	5%	1/10W
R555	1-216-073-00	METAL CHIP	10K	5%	1/10W
R556	1-216-302-00	METAL CHIP	2.7	5%	1/10W
R557	1-216-156-00	METAL CHIP	18	5%	1/8W
R558	1-216-072-00	METAL CHIP	9.1K	5%	1/10W
R559	1-216-086-00	METAL CHIP	36K	5%	1/10W
R560	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R561	1-216-200-00	METAL CHIP	1.2K	5%	1/8W
R562	1-216-145-00	METAL CHIP	6.2	5%	1/8W
R563	1-216-200-00	METAL CHIP	1.2K	5%	1/8W
R564	1-216-045-00	METAL CHIP	680	5%	1/10W
R565	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R566	1-216-298-00	METAL CHIP	2.2	5%	1/10W
R567	1-216-298-00	METAL CHIP	2.2	5%	1/10W
R601	1-216-049-00	METAL CHIP	1K	5%	1/10W
R602	1-216-033-00	METAL CHIP	220	5%	1/10W
R603 ⚠	1-216-322-00	METAL CHIP	5.6K	1%	1/8W
R604 ⚠	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R801	1-216-184-00	METAL CHIP	270	5%	1/8W
R802	1-216-033-00	METAL CHIP	220	5%	1/10W
R803	1-216-190-00	METAL CHIP	470	5%	1/8W
R804	1-216-033-00	METAL CHIP	220	5%	1/10W
R805	1-216-224-00	METAL CHIP	12K	5%	1/8W
R806	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R807	1-202-727-00	SOLID	4.7M	10%	1/2W
R808	1-216-280-00	METAL CHIP	2.7M	5%	1/8W
R809	1-216-280-00	METAL CHIP	2.7M	5%	1/8W
R811	1-216-105-00	METAL CHIP	220K	5%	1/10W
R812 ⚠	1-216-190-00	METAL CHIP	470	5%	1/8W
R813 ⚠	1-216-190-00	METAL CHIP	470	5%	1/8W
R851	1-216-222-00	METAL CHIP	10K	5%	1/8W
R852	1-216-073-00	METAL CHIP	10K	5%	1/10W
R853	1-216-079-00	METAL CHIP	18K	5%	1/10W
R854	1-216-079-00	METAL CHIP	18K	5%	1/10W
R855	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R856	1-216-092-00	METAL CHIP	62K	5%	1/10W
R857	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R858	1-216-041-00	METAL CHIP	470	5%	1/10W
R859	1-216-099-00	METAL CHIP	120K	5%	1/10W
R860	1-216-219-00	METAL CHIP	7.5K	5%	1/8W
R861	1-216-097-00	METAL CHIP	100K	5%	1/10W
R862	1-216-089-00	METAL CHIP	47K	5%	1/10W
R863	1-216-102-00	METAL CHIP	160K	5%	1/10W
R864	1-216-073-00	METAL CHIP	10K	5%	1/10W
R865	1-216-049-00	METAL CHIP	1K	5%	1/10W
R866	1-216-049-00	METAL CHIP	1K	5%	1/10W
R867	1-216-097-00	METAL CHIP	100K	5%	1/10W
R868	1-216-049-00	METAL CHIP	1K	5%	1/10W

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

ELECTRICAL PARTS

Ref.No.	Part No.	Description
R901	1-216-150-00	METAL CHIP 10 5% 1/8W
R902	1-216-150-00	METAL CHIP 10 5% 1/8W
R903	1-216-009-00	METAL CHIP 22 5% 1/10W
RV151	1-230-038-00	RES, ADJ, CARBON 100K
RV152	1-230-039-00	RES, ADJ, CARBON 200K
RV153	1-230-037-00	RES, ADJ, CARBON 50K
RV154	1-230-038-00	RES, ADJ, CARBON 100K
RV155	1-230-397-11	RES, VAR, CARBON (WITH SW)200K(TUNING)
RV201	1-230-035-00	RES, ADJ, CARBON 10K
RV401	1-226-430-00	RES, ADJ, CARBON 5K
RV451	1-228-898-00	RES, VAR, CARBON 10K (VOLUME)
RV551	1-226-435-00	RES, ADJ, CARBON 200K
RV552	1-230-036-00	RES, ADJ, CARBON 20K
RV601⚠	1-228-991-00	RES, ADJ, CARBON 2K
RV801	1-228-573-00	RES, ADJ, CARBON 2M
RV802	1-230-033-00	RES, ADJ, CARBON 4.7M
RV851	1-230-036-00	RES, ADJ, CARBON 20K
RV852	1-230-035-00	RES, ADJ, CARBON 10K
S151	1-554-123-00	SWITCH, SLIDE (BAND SELECT)
S601	1-554-123-00	SWITCH, SLIDE (POWER)
SP901	1-503-398-11	SPEAKER (ROUND TYPE)(3CM)
T501	1-406-051-00	COIL, HORIZONTAL OSC
T801 ⚠	1-439-352-11	TRANSFORMER ASSY, FLYBACK
T802	1-439-313-00	TRANSFORMER, HORIZONTAL OUTPUT
TH501	1-800-193-00	THERMISTOR S-68-01
TH551	1-800-198-XX	THERMISTOR S-1K
V901 ⚠	8-735-951-21	CRT 02JM (PS)

ACCESSORY & PACKING MATERIAL

Part No.	Description
3-314-035-00	CUSHION
3-314-036-00	SPACER
3-314-040-00	SLEEVE, ACCESSORY
3-314-046-00	(SILVER,BLUE)...CASE, CARRYING
3-314-048-00	(BLACK).....CASE, CARRYING
3-314-080-01	STRAP
3-323-338-01	INDIVIDUAL CARTON
3-701-622-00	BAG, POLYETHYLENE, FOR INSTRUCTION MANU
*3-703-910-01	(BLACK)....LABEL, COLOR
3-703-913-01	(SILVER)...LABEL, COLOR
3-703-916-01	(BLUE).....LABEL, COLOR
3-773-384-23	MANUAL, INSTRUCTION
3-881-410-00	BAG, PROTECTION, FOR SET
4-491-213-22	INSTRUCTION

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

9-963-120-85

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FD-20A

SERVICE MANUAL

US Model

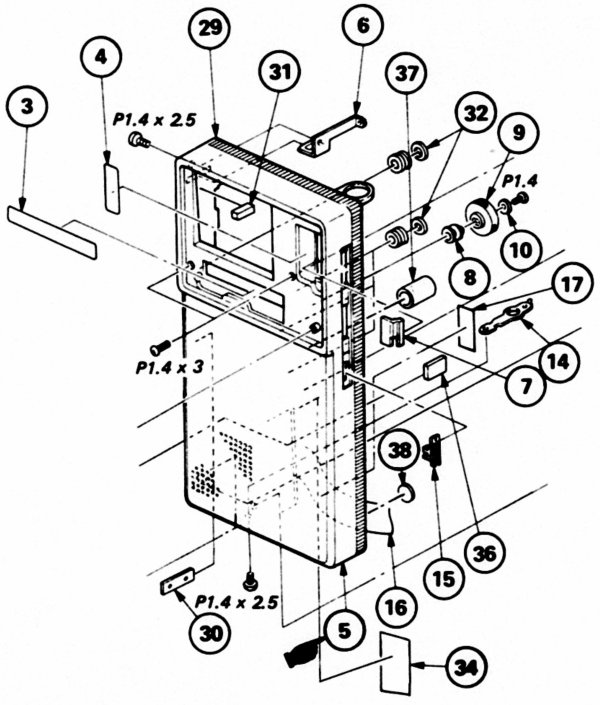
SUPPLEMENT

File this supplement with the service manual.

No. 4
September, 1985

Cabinet with HONDA logotype has been added.

Ref. No.	Part No.	Description
5	X-3314-055-1	CABINET (UPPER) SUB ASSY



FLAT BLACK AND WHITE TV

SONY

Sony Corporation

9-963-120-85

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FD-20A

SERVICE MANUAL

US Model

SUPPLEMENT

No.3
September, 1984

File this supplement with the service manual.

Black type and some sets with team name have been designed.
Add the following parts to the parts list in the FD-20A service manual.

GENERAL SECTION

No.	Part No.	Team or Color	Description
5	X-3314-040-1	(BLACK)	CABINET, UPPER ASSY
5	X-3314-043-1	(SUPER BOWL)	CABINET, UPPER ASSY
5	X-3314-044-1	(MARSHALL FIELDS)	CABINET, UPPER ASSY
5	X-3314-045-1	(MICHIGAN)	CABINET, UPPER ASSY
9	3-314-013-00	(SUPER BOWL)	KNOB, TUNING
9	3-314-013-11	(BLACK)	KNOB, TUNING
9	3-314-013-11	(MARSHALL FIELDS)	KNOB, TUNING
9	3-314-013-11	(MICHIGAN)	KNOB, TUNING
15	3-314-027-01	(SUPER BOWL)	KNOB (A), SLIDE
15	3-314-027-11	(BLACK)	KNOB (A), SLIDE
15	3-314-027-11	(MARSHALL FIELDS)	KNOB (A), SLIDE
15	3-314-027-11	(MICHIGAN)	KNOB (A), SLIDE
55	3-314-039-01	(SUPER BOWL)	KNOB (B), SLIDE
55	3-314-039-11	(BLACK)	KNOB (B), SLIDE
55	3-314-039-11	(MARSHALL FIELDS)	KNOB (B), SLIDE
55	3-314-039-11	(MICHIGAN)	KNOB (B), SLIDE
56	3-314-033-21	(MICHIGAN)	CABINET (LOWER)
56	3-314-033-31	(SUPER BOWL)	CABINET (LOWER)
56	3-314-033-81	(BLACK)	CABINET (LOWER)
56	3-314-033-81	(MARSHALL FIELDS)	CABINET (LOWER)
57	3-314-029-03	(SUPER BOWL)	STAND
57	3-314-029-13	(BLACK)	STAND
57	3-314-029-13	(MARSHALL FIELDS)	STAND
57	3-314-029-21	(MICHIGAN)	STAND
59	3-314-023-21	(MICHIGAN)	LID, BATTERY CASE
59	3-314-023-31	(SUPER BOWL)	LID, BATTERY CASE
59	3-314-023-71	(BLACK)	LID, BATTERY CASE
59	3-314-023-71	(MARSHALL FIELDS)	LID, BATTERY CASE
60	3-314-022-01	(SUPER BOWL)	KNOB, ADJUSTMENT
60	3-314-022-11	(BLACK)	KNOB, ADJUSTMENT
60	3-314-022-11	(MARSHALL FIELDS)	KNOB, ADJUSTMENT
60	3-314-022-11	(MICHIGAN)	KNOB, ADJUSTMENT
63	X-3314-012-1	(MICHIGAN)	HOLDER, PIECE, CONTACT, BATTERY SUB ASSY
63	X-3314-013-1	(SUPER BOWL)	HOLDER, PIECE, CONTACT, BATTERY SUB ASSY
63	X-3314-039-1	(BLACK)	HOLDER, PIECE, CONTACT BATTERY SUB ASSY
63	X-3314-039-1	(MARSHALL FIELDS)	HOLDER, PIECE, CONTACT, BATTERY SUB ASSY
64	3-314-026-00	(SUPER BOWL)	KNOB CONTROL (VOLUME)
64	3-314-026-11	(BLACK)	KNOB CONTROL (VOLUME)
64	3-314-026-11	(MICHIGAN)	KNOB CONTROL (VOLUME)
64	3-314-026-11	(MARSHALL FIELDS)	KNOB CONTROL (VOLUME)
*7-627-850-17		(SUPER BOWL)	SCREW, PRECISION +P 1.4X2.5
*7-627-850-18		(BLACK)	SCREW, PRECISION +P 1.4X2.5
*7-627-850-18		(MARSHALL FIELDS)	SCREW, PRECISION +P 1.4X2.5
*7-627-850-18		(MICHIGAN)	SCREW, PRECISION +P 1.4X2.5

ACCESSORY & PACKING MATERIALS

Part No.	Team or Color	Description
3-314-046-04	(MICHIGAN)	CASE, CARRING
3-314-048-04	(MARSHALL FIELDS)	CASE, CARRING
3-314-048-04	(BLACK)	CASE, CARRING
3-314-046-04	(SUPER BOWL)	CASE, CARRING
3-703-910-01	(BLACK)	LABEL, COLOR

Note

"MICHIGAN" means THE UNIV. OF MICHIGAN.

* marks is the installing screws for the cabinet.

FLAT BLACK AND WHITE TV

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FD-20A

SERVICE MANUAL

SUPPLEMENT

File this supplement with the service manual.

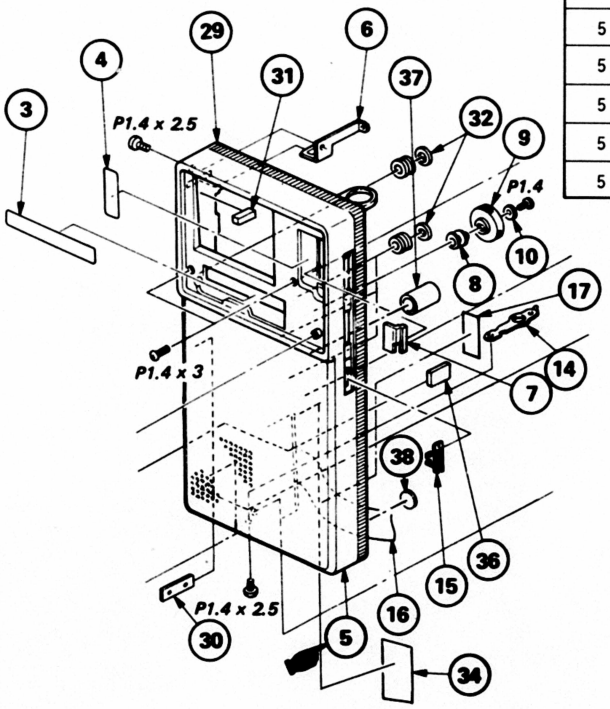
US Model

No. 2

February, 1984

Cabinets with team names of major league have been added.

Ref.No.	Part No.	Description
5	X-3314-029-1	CABINET (UPPER) SUB ASSY, FOR RED SOX
5	X-3314-029-2	CABINET (UPPER) SUB ASSY, FOR YANKEES
5	X-3314-029-3	CABINET (UPPER) SUB ASSY, FOR METS
5	X-3314-029-4	CABINET (UPPER) SUB ASSY, FOR PHILLIES
5	X-3314-029-5	CABINET (UPPER) SUB ASSY, FOR ORIOLES
5	X-3314-029-6	CABINET (UPPER) SUB ASSY, FOR BRAVES
5	X-3314-029-7	CABINET (UPPER) SUB ASSY, FOR WHITE SOX
5	X-3314-029-8	CABINET (UPPER) SUB ASSY, FOR CUBS
5	X-3314-029-9	CABINET (UPPER) SUB ASSY, FOR ROYALS
5	X-3314-030-1	CABINET (UPPER) SUB ASSY, FOR BREWERS
5	X-3314-030-2	CABINER (UPPER) SUB ASSY, FOR TWINS
5	X-3314-030-3	CABINER (UPPER) SUB ASSY, FOR TIGERS
5	X-3314-030-4	CABINER (UPPER) SUB ASSY, FOR PIRATES
5	X-3314-030-5	CABINER (UPPER) SUB ASSY, FOR REDS
5	X-3314-030-6	CABINER (UPPER) SUB ASSY, FOR DODGERS
5	X-3314-030-7	CABINER (UPPER) SUB ASSY, FOR ANGELS
5	X-3314-030-8	CABINER (UPPER) SUB ASSY, FOR PADRES
5	X-3314-030-9	CABINER (UPPER) SUB ASSY, FOR GIANTS



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FD-20A

SERVICE MANUAL

US Model

REVISED

SUPPLEMENT

File this supplement with the service manual.

Discard FD-20A SERVICE MANAUL SUPPLEMENT No. 1 (No. 9-963-120-81) previously issued.

No. 1
April, 1985

SAFETY RELATED CHECKS

The following components in this manual have been carefully factory-selected for each set in order to satisfy regulations regarding X-ray radiation. Should replacement be required, replace only with the value originally used.

Repairing components:

R812 R813 D807 D808

Procedure:

1. Supply the voltage from DC IN 6V jack(CN601) so that the VOM reads 7.76V.
2. Confirm that the raster appears at that time.
3. Supply the voltage from DC IN jack so that the VOM reads 8.77V.
4. Confirm that the raster disappears at that time.

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